

THE IRON AGE

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New York, March 14, 1918

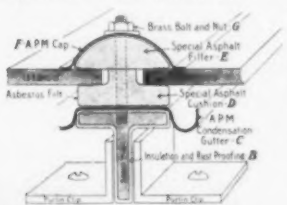
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THE IRON AGE

New York, March 14, 1918

ESTABLISHED 1855

VOL. 101: No. 11

Handling Production in a Small Shop

A System Which Gives Complete Information Regarding Planning and Progress of Work with a Minimum of Clerical Labor

— BY ROBERT THURSTON KENT* —

THE great bulk of literature which has appeared in recent years regarding shop management has outlined systems of handling work which have been applicable only to large establishments, and which have required a considerable clerical force. Rightly or wrongly, much of the criticism which has been leveled against scientific management has dealt with the large amount of "non-productive labor" that it entailed. The small manufacturer, employing 100 hands or less, has felt, even while admitting the beneficial results that would accrue from the adoption of such methods, that a plant of such size could not afford to maintain the elaborate mechanism necessary to carry on an intensive production system. There are, however, many features of such a system which he can adopt, at a comparatively small expense, and which will bring results out of all proportion to the expense involved.

Without adopting such things as balance of stores, time study, piece rates, task and bonus work, the production of the plant can be increased, delivery schedules fixed and maintained and the men and machines kept busy, with a consequent decrease in the expense by means of intelligent advance planning and a routing or order of work system. These are fundamental features of scientific management, and the other refinements can be added later if it is found desirable to do so.

There is described below a system of handling the work by these means in a shop of less than 100 workers. It was used by the writer and gave absolute control of the progress of the work. The

entire amount of clerical labor required took but a portion of the time of one stenographer. The output of the shop consisted partly of a standard line of iron and steel articles, assembled into several hundred standard products, and partly of special products, made of drawings and specifications, and bearing little or no resemblance to the standard line. As the standard line is a highly competitive one, the name of the concern is suppressed, and the description of the parts is changed in what follows so that the product will not be identified. The system described, however, is a bona fide one and can be applied, with the necessary modifications, to any small shop manufacturing either a standard or a non-standard line or a combination of the two.

A Set of Symbols Desirable

A desirable, although not necessary, adjunct of the system is a set of mnemonic symbols for the standard product and the component parts thereof. These will reduce the amount of writing required to a minimum and save a vast amount of time on the part of the stenographer or clerk who looks after the clerical end of the job. Furthermore, as a correctly devised mnemonic symbol completely identifies each part, and excludes every other part, the symbol system may be used as the basis of the storeroom arrangement. The symbols also may be used to identify the patterns, and if the pattern storage be arranged according to the symbol classifications it will be a comparatively easy matter to lay hands on any particular pattern desired, without the enormous loss of time which is inevitable where

Bill of Material				
Order No. <u>D-126</u>		Date <u>Sept. 27-1917</u>		
<u>10 - JH. 4018</u>				
Item	Symbol	Quantity for one	Quantity for Order	Quantity to be made
	JHC408	1	10	10
	JHR408	1	10	10
	JHS408	1	10	6
	JHP40	1	10	5
	JHPP	1	10	0
	JHBV	2	20	0
	JHS40	1	10	0
	JHD	1	10	10
	FB	2	20	0
<i>Grand total.</i>	JHPH	1	10	10
	JHSC	1	10	0
	JHSP	1	10	0

Fig. 1—It Is Difficult to Omit Any Item Required for an Order when the Bill of Material Is Properly Made Up as the Storekeeper Must Fill In Every Space in the Last Column

*41 South Willow Street, Montclair, N. J.

Order No. <u>D-126</u>		Order of Work		7623		
Date <u>Sept. 28, 1917</u>						
<u>10-JH 4018</u>						
Job Ticket	Man	Machine	Description of Job	Drawing	Job Finished	Labor Cost
10682	17	LT-1	Rough bore 10-JHC 4018	A-176	Sept. 30	
10683	32	BH-2	Finish bore 10- "		Oct. 1	
10684	37	G1	Grind 10- "		Oct. 2	
10685	15	LE-6	Turn 10- "		Oct. 3	
10686	15	LE-4	Turn 10-JHR 4018	A-195	Sept. 30	
10687	23	DU-2	Drill 10- "			
10688	76	BU-1	Bore and Face 6-JHS-4018	A-214	Oct. 2	
10689	15	DU-5	Drill 6- "			
10690	27	LT-3	Drill 5-JHP-40	B-89	Oct. 1	
10691	56	LE-3	Turn 5- "			
10692	40	G-2	Grind 10-JHD	A-17	Oct. 2	
10693	18	DU-2	Drill 10-JHPH			
10694	43		Assemble			
Total _____						

Fig. 2—The Obverse of the Order of Work Sheet Gives Complete Information as to Where and How an Order Is to be Filled

no such means of locating patterns is provided. If it is deemed inexpedient to classify and symbolize the product, written descriptions of the various parts can be used in carrying out the system described, although this procedure will materially increase the amount of clerical work to be done. The method of developing the symbol system will not be described here. There are available several excellent papers and at least one good book on the subject, from which complete information can be obtained.

The Forms Required

Aside from the job tickets issued to the workmen, and which are their authority for making the various parts called for on the several orders, but three forms are necessary for routing the

work and controlling its movement through the shop. These are: the bill of material, the order of work sheet and the progress sheet. In addition to these there is a manufacturing order, which has nothing to do with the operation of the shop, but whose function is simply to advise the superintendent of the receipt of the order and is his authority for making up the parts necessary to fill it. The manufacturing order is a transcript of the customer's original order on a standard form, the original of which remains with the accounting department, while the carbon copy goes to the superintendent. When the order is completed a notation to that effect is made on the copy, which is then returned to the accounting department as a notification to bill the order to the customer.

Material Required							
Purchase Order	Quantity	Item	Vendor	Due	Delivered	Cost per Unit	Gross Cost
2286	6	Castings-Iron Patt. JHS 4018	West Troy	Sept 30	Sept 30		
2287	5	Brass Castings	Eureka Brass Works	Sept 30	Sept 30		
Total \$							
Labor Cost							
Overhead							
Material from Stock							
Freight, Etc. _____							
Total Cost, \$							

Fig. 3—The Reverse of the Order of Work Tells Where Material Has Been Purchased for the Job and When It Should Be Delivered. It also tells the cost of the completed job

The bill of material is shown in Fig. 1. While this may be dispensed with if desired, this course is inadvisable. The time saved in the shop by its use more than balances the time and expense of making it up. The bill is ruled into five columns as shown, and a set of sheets was printed for each item of the standard product of the shop. On the blank lines at the top are printed the name and symbol of the complete assembled piece, while in the column entitled "Symbol" are printed the symbols of the several parts entering into the assembly. In the adjoining column are the number of parts of each symbol required to assemble one piece. Only in the case of non-standard product are entries made in the column entitled "Item," and in this case a brief descriptive name is written as "sheave," "bracket," "wire rope," etc.

When an order is received in the shop for a standard product, the bill of material sheet for that particular product is filled in with the order number and the date, the quantity is written in before the name or symbol at the top, and the quantity of each of the several parts required is entered in the fourth column. These quantities are obtained by multiplying the figures in column 3 by the number of pieces in the order.

than is usually realized. Many establishments depend to a greater or less extent on the knowledge of men who have been in their employ for 20 or 30 years, and are without adequate records either as to the material entering into certain of their product or of the methods of making it. The severing of the connection of these men with the firm, by death or otherwise, means a loss that cannot easily be repaired.

In the case of a non-standard product, the order is analyzed by the superintendent, who lists on a blank bill of material form all the component parts of the job. He endeavors to use as many standard parts as possible, and in addition to the name which is written in the "Item" column, gives the symbol of the standard parts. The non-standard parts, of course, have no symbol. The bill of material then goes to the storekeeper and the same routine is followed as in the case of the standard product.

The Order of Work Sheet

The order of work sheet is shown in Figs. 2 and 3. In size it is 5 x 8 in. The blank lines at the top are filled in with the quantity and description of the goods called for by the customer's

	Cyl.	Pigr.	Reser.	Pump	Base	Top	Sleeve	Small Parts	Assemble	Ship
7623 10 JH 4018	RR-4682 FB-830 F-84	F10676 D 87 F 88	B 10683 89	D-10690 T 10691				G 10692 10693	10694-A	Oct. 9
7624 2 JH 1018	F10668 F10669	F10664 D10665			10668-T 10668-D	10666-DT 10667-D		10670 10671	10669-A	Oct. 2
7625 5 JUC 1012	RB10713 FB10714 G 10715 T10716	T10717 D10718			T10721	BT10719 D 10720	B 10722 T 10723		10724-A	Oct. 15

Fig. 4—The Progress Sheet Enables the Superintendent to Visualize the Entire Shop and the Condition of Each Order in Progress

The bill of material is then sent to the storekeeper, who ascertains whether or not the required quantities of each part are on hand and available for use. If they are he sets them aside for the particular order in hand and enters a zero in the last column of the bill of material. If there is a shortage of any item he enters in the last column the amount of such shortage and returns the bill of material to the shop office, where the order of work sheet is made out from it.

There are many advantages in printing a full list of the parts required for each of the standard products. Without the printed list before him, the storekeeper is liable to overlook or forget some part essential to the complete assembly, and would report an incomplete list of items for manufacture. Such an omission is often not discovered until assembly is begun, and then a delay of several days may ensue while the missing part or parts are being made. Furthermore, a printed list renders the shop absolutely independent of the knowledge that the men may have of the product, which knowledge may be lost if the men, particularly the older ones, leave the employ of the company. This is a matter of greater importance

order, while in the body are listed the operations which must be performed in the shop to complete the order. When the storekeeper returns the bill of material, showing the shortages on an order, to the office the superintendent decides upon the sequence of operations necessary to fill them and dictates the list to the stenographer. If a certain operation is to be performed on a particular machine he indicates the fact by giving the machine symbol in connection with the operation. Otherwise, he simply indicates the general class of machine on which the work should be done, and the particular machine in the class to which the work will be routed is decided by the exigencies of the case when the work is actually put in process. Likewise, the man who is to do the work is indicated if the operation is such as to require a man of peculiar ability. If there is a delivery promise on the order, the date at which each operation must be finished in order to keep that promise is also given.

At the same time that he is dictating the order of work the superintendent dictates purchase orders for all material which must be bought outside. This will include castings, spe-

cial forgings, standard supplies as bolts, structural material, etc. He also indicates the latest date at which the material can be delivered if the order is to be put through the shop on schedule time.

The stenographer then proceeds to transcribe this information to the order of work sheet. Fig. 2 shows how the operations called for by the bill of material in Fig. 1 are listed. On the reverse of the order of work sheet is written the information regarding the material purchased outside. From the list of operations the stenographer then prepares the job tickets for the workmen, and enters the serial number of the several tickets in the proper column of the order of work sheet, and also in the progress sheet which is described later. When the operation has been completed and the job ticket returned, the date is entered in the column "Job Finished," and the labor cost computed and entered in the column "Labor Cost." The total labor cost is afterward transferred to the summary on the reverse side of the sheet, together with the overhead charges, freight and other miscellaneous charges, and the total cost of the order is entered at the bottom.

An inspection of Figs. 2 and 3 will reveal that the order of work will give complete information regarding the job. It tells not only the cost, but shows the men and machines best fitted to do similar work on other jobs of the same character, the dealers from whom material was purchased, drawing and pattern numbers, and by reference to the job tickets the time required for each operation. For standard products, of course, this information is seldom required, but for special or non-standard work it is essential for purposes of estimating on repeat or similar orders, and also for the purpose of showing just how these special jobs were done. Too often in many concerns it is assumed that a special job will never be repeated, and no record of the operations, methods, etc., is made. On a repeat order, then, the method must be devised all over again, and often the second method is less efficient and more costly than the first.

The order of work sheets are put up in pads of 50 and numbered serially. The order number is written in the proper space when the work called for is to fill a customer's order, and the word "stock" when the work is to be done to replenish the storeroom supply. If the work is for new equipment for the shop or for a repair the words "shop equipment" or "shop repair" are used. The order number is filled in simply to tie the shop routine to the customer's order. The serial number of the order of work is the order number so far as the shop is concerned, and all reference to work in process is by means of this serial number.

When the order of work sheet is filled out it is filed in a card file drawer, entitled "Live Orders." As the various operations are completed they are dated off, until finally all are complete, when the sheet is removed to a permanent file entitled "Completed Orders." It is evident that the order of work sheet gives complete information as to the progress of a job through the shop. The operations which are dated off are completed. Those which are undated are either incomplete or are in process, reference to the duplicate job ticket on the bulletin board will show which. The approximate location of each part of an order is also shown by the order of work sheet, as the part will be either at the machine where the last

completed operation, as shown on the sheet, was performed or at the next uncompleted one.

The Progress Sheet

For a long period the work was controlled solely by means of the order of work sheets. This, however, involved the handling and rehandling of the sheets several times each day, and it also contained the possibility of overlooking important orders. The time consumed in this constant reinspection to keep familiar with the condition of the work was no inconsiderable item. With from 50 to 100 orders in the shop at one time it was impossible to keep the details of each one in mind, and it became desirable to adopt a means whereby the work in the shop as a whole and of each order could be visualized. The progress sheet, Fig. 4, was the result.

The progress sheet is 8½ x 11 in., punched to fit a standard loose-leaf note book. It is ruled both horizontally and vertically, the first column being 1¼ in. wide and the remaining ones ¾ in. The horizontal rules were each ½ in. apart. Each column represented a part of the standard product, as shown by the heading at the top. There are nine principal classes of parts, and three of the columns were kept blank for non-standard or special parts. In the last column are entered the shipping dates, and in the first column the particulars of the several orders as shown. Each horizontal line represents an order of work sheet. In the various spaces are entered under the appropriate column heads the serial numbers of the job tickets prepared for the several operations on the different parts, together with an initial showing the type of operations, as B, T, D, for bore, turn, drill, etc. The particulars entered in the first column comprise the number of the order of work sheet, the quantity and the symbol or name of the product called for.

The orders are entered in the sequence of the order of work cards. On the first of each month all the orders ahead which are to be shipped that month are entered on a new set of progress sheets, and all unfinished orders are transferred from the previous month's sheets. In order to call attention to the orders which are to be shipped in any given week a vertical line is drawn with a colored pencil between the first and second columns of each order. A red line signifies a shipment to be made the first week of the month, a blue line a shipment for the second week, a yellow line one for the third week, and a green line one for the last week of the month. If no mark is made, it signifies that no shipping date has as yet been assigned or that the shipping date is set for the following month. In this case the date is entered in the last column.

At the same time that the stenographer makes out the job tickets she enters their numbers on the order of work sheet and the progress sheet. When the job ticket is issued to the shop a check is made alongside its number on the progress sheet. When the ticket is turned in, indicating that the job is finished, the number is canceled on the progress sheet by drawing a pencil mark through it. Thus a glance at the progress sheet will show just how far every order in the shop has progressed, what operations are at that instant under way and how much work yet remains to be done. Orders that are lagging can be rearranged and expedited, while orders that are ahead of schedule can be set aside in favor of more urgent work with the least possible confusion.

Another valuable feature of the progress sheet is the fact that it shows the amount of work ahead of each class of machine in the shop. Take, for example, the case of cylinders. These are rough bored in a turret lathe, finish bored and turned in a special boring machine, ground in a special grinding machine, and turned in engine lathes. Running down the cylinder column and noting the number of RB (rough bore) symbols preceding uncanceled job ticket numbers in the orders for a given week enables the superintendent to know just how much time he must devote to that week's orders, and about the time he will be able to start on other work or when he can insert later orders in the schedule for the turret lathe. Similarly, he can obtain the facts for the boring machine, grinder and engine lathes, thus speeding up the schedule, as opportunity offers.

The progress sheets are inserted in a loose-leaf note book, eight to ten being required for each month's orders. An advantage of the note book form of the sheets is that it can be conveniently taken into the shop and checked up by an actual inspection of the work at each machine. As each order is completed the line representing it is canceled by crossing out the first and last columns with the color of pencil representing the week in which the work was finished, as explained above. While this feature is not necessary it is of interest in showing how closely to schedule the shop is operating. If the cancellation marks are of the same color as the vertical mark alongside the first column the shop is on schedule, while if a series of blue cancellations are made alongside red indication marks the shop has fallen behind. Similarly, if blue cancellations appear alongside green or yellow indications, the shop is ahead of schedule for those particular orders. The psychological effect of this proceeding is good, since an indication of failure to keep up to schedule may remain in evidence for a month, and act as a constant spur to increased effort.

The Job Ticket

As previously indicated, orders are issued to the workmen by means of job tickets posted on a bulletin board. The job tickets, one of which is shown in Fig. 5, are written in duplicate. The original goes into the shop, while the duplicate remains on the board to show the work on which the man is engaged. When a workman finishes his job he brings the ticket to the shop office and the time is stamped on the back of both the original and duplicate. The tickets for the next job are removed from their hooks on the board, the time stamped on them, the original given to the man, while the duplicate is posted on the board. The elapsed time is calculated from the returned tickets, the labor cost extended on the order of work sheet, and the original is filed according to its serial number, while the duplicate is destroyed.

The job tickets are 3 x 5 in., printed on a light but tough paper, and punched with two holes, 3 in. apart for the bulletin board hooks. At the top is the serial number, a space for the man's name or number, another for the order of work sheet number, and one for the machine number where the work is to be done. A space was originally provided for the date, but this is unnecessary, as the date is now put on by means of the time stamp. Below, explicit directions are given for the performance of the operation. One ticket is issued for each operation.

The bulletin board consists of a series of hooks, one set for each man in the shop. A set

consists of two groups of two hooks. The upper set is reserved for the job actually in process, while the lower set holds the jobs that have been assigned to the man, but upon which he has not yet begun work. The order in which the jobs are to be taken up is indicated by the arrangement of the tickets on the lower group of hooks, the first job being in front, the second immediately behind, etc. Every night, prior to quitting time, the superintendent studies his progress sheets, ascertains therefrom the jobs that are needed first, and arranges the tickets for them on the hooks of the workmen who are to do the work. He is guided in this by his knowledge of the capabilities of the men and by the relative importance of the several orders under way. The aim is to always keep at least one day's work posted ahead of each man.

With the initial job ticket for each part made a tag is made out and posted with the ticket. This

Fig. 5—The Job Ticket Gives Explicit Directions to the Workman

tag, which is an ordinary shipping tag, carries the order of work sheet number and the quantity and symbol of the part called for by the job ticket. The workman attaches this tag to the lot of parts and it accompanies it through the shop to the assembly floor, serving to identify at any time the parts for each order that may be under way.

German Labor Disputes in 1916

Labor disputes in Germany in 1916 show a considerable increase over 1915, both as regards the number of persons involved and the days lost, according to a recent issue of the journal of the German Department and Labor Statistics, abstracted in the *London Iron and Coal Trades Review*. In 1916 the disputes numbered 240, all of which were strikes, and they involved 124,188 workmen. The days lost in 1916, both actually and in relation to the number of disputes, were much fewer than the average for the five years immediately preceding the outbreak of the war.

Year	No. of Disputes	No. of Workmen Directly Involved	No. of Working Days Lost
1909-13 (average)	2,595	327,593	11,190,494
1914	26	95,140	2,843,895
1915	141	12,866	45,511
1916	240	124,188	245,404

The three groups of trades affected most seriously by the 1916 disputes, taking the estimated number of days lost as the criterion, were: Mining, 100,121 days; metal, 37,900 days, and engineering, 52,400. In these three the aggregate loss in working days amounted to 58 per cent of the total in all trades combined. From the point of view of the working people 27 of the disputes were fully successful, 130 partly so and 83 wholly unsuccessful.

The Peerless Foundry Co., Latrobe, Pa., is taking bids for the construction of a new one and two-story foundry, about 80 x 275 ft., one-story power plant, 30 x 80 ft., and one-story core oven building, to cost about \$150,000. Headquarters of the company are in the Conestoga Building, Pittsburgh.

The Manufacture of Steel Sheets

What to Consider in General Layout
and Range of Product—Disposition of
Rolls—Heating and Annealing Furnaces

BY CLEMENT F. POPPLETON

(With Supplemental Plate)

THE importance of sheet and tin plate manufacture to the United States, and, in fact, to the world, can hardly be exaggerated at the present time, nor is it within the bounds of possibility that the importance of these partly allied industries will become less as time goes on. The tin plate industry was dealt with by the author in an article published in *THE IRON AGE* of Jan. 3, 1918.

The necessity for sheet iron or steel for many products not now generally made from this material is becoming more and more apparent. Furthermore, it cannot be said that this growing demand is the direct result of the lamentable war conditions now existing. The growing scarcity of lumber, more particularly of the better qualities such as oak, maple and other finishing lumber of slow growth, has been apparent for years, and the unfortunate deforestation of the land has made the probability of the return of the old-time abundance very remote, if not a commercial impossibility. Thus it appears that apart from the hitherto well known and by constant usage considered essential needs for this product, new fields are constantly opening up.

Within comparatively few years we have seen the ornamental plaster ceilings of our fathers replaced by sheet steel. Doors, windows and trim in our skyscrapers are sheet steel masquerading as oak, mahogany or other woods. Railroad cars, Pullman and coaches, street cars and subway cars no longer rely upon the uncertain and inflammable lumber, but turn to the sheet mill for their material. The roll-top desk and filing cabinet look also in the same direction and will continue to do so.

The automobile industry alone has created a demand nearly equal to the whole production of the United States of twenty years ago. As is naturally to be supposed, with the constantly increasing demands for a wider variety of sizes and quality, great advances have been made in the art, a modern American sheet mill bearing as little resemblance to its progenitor of Great Britain in the late 60's as the present country bears to the colonists of Revolutionary days.

Desirable Features of Sheet Mill Layouts

To enable the reader to follow more intelligently the process of manufacture, a typical layout of a modern mill is appended and further references to its leading features and to the reasons therefor will be made as the description of the various stages of the manufacture are reached. It will be apparent at once that a single design of a mill layout cannot be applied economically to all conditions.

The mill as illustrated is one of a group of finishing mills including plate mill, jobbing mill, merchant mill, etc. This group is all arranged with the mills parallel to each other and at an angle of approximately 30 deg. to the incoming (raw material) tracks and the outgoing (finished product) tracks. This arrangement greatly facilitates

switching and further makes it possible to arrange a common stock yard (covered by crane) and common warehouse for shipping (also with crane service) to be arranged at the opposite ends of the mill groups, a very desirable feature, particularly where a large steel works must split up its total output into many varieties of finished products.

The mills of this group are at the present time being manufactured in the United States for early shipment and erection abroad. The general arrangement of the sheet mill as illustrated would have to be modified to suit local conditions, and very considerably so, if the mill were entirely independent of other mills, and the acreage available were not of much greater length than breadth.

As a matter of comparison the layout of the John Summers Sons' mill at Chester, England, is also shown. This is situated on the tidal River Dee and can ship directly to the overseas markets or by coasting vessel to Liverpool (a matter of less than 50 miles by sea). This mill is one of the largest in Great Britain, but has the common fault of the English, and it may be truly said of the older American mills—lack of room. The space between the furnaces and roll train is too short, the roof is too low (20 ft. to the lower chord) and the buildings generally have not sufficient span.

Several of its features, however, might be embodied into modern mills with advantage. Through no particular thought of the general welfare, I am afraid, but because the Dee is a salmon river, and waste acid could not be run into it, an acid recovery plant was installed, where indicated, and *mirabile dictu* was found to be a paying investment.

The track layout is also good. This layout was made by the author, but conditions and precedent, amounting almost to traditions, spoiled the full fruition of the idea.

Commercial Limits of Sheet Mills

Before proceeding to describe the process of manufacture of sheets in detail, it will be well to define what is covered by the term sheet iron. This generic term is given to sheets of either iron or steel; in fact, very little of the old-fashioned puddled iron sheet is now produced.

The sheets run in length from 5 ft. to 12 ft., in width from 24 to 48 in. and in thickness from No. 31 to No. 12 gage. The extremes are 36 x 84 in. in No. 31 gage to 48 x 120 in. in No. 12 gage. Special sheets are rolled on special mills exceeding these limits, barrel sheets being rolled 60 in. wide by 72 in. long in No. 22 gage and some few sheets 144 x 48 in. in No. 12 gage.

As a matter of works efficiency and economy, sheets below No. 28 gage in thickness do not pay and should be rolled on a tin mill and sheets over No. 16 gage in thickness should be rolled on a jobbing plate mill. In this, as is obvious, the large steel works with a group of diversified mills will always have an advantage over the single plant, which to retain its customers is obliged to accept all

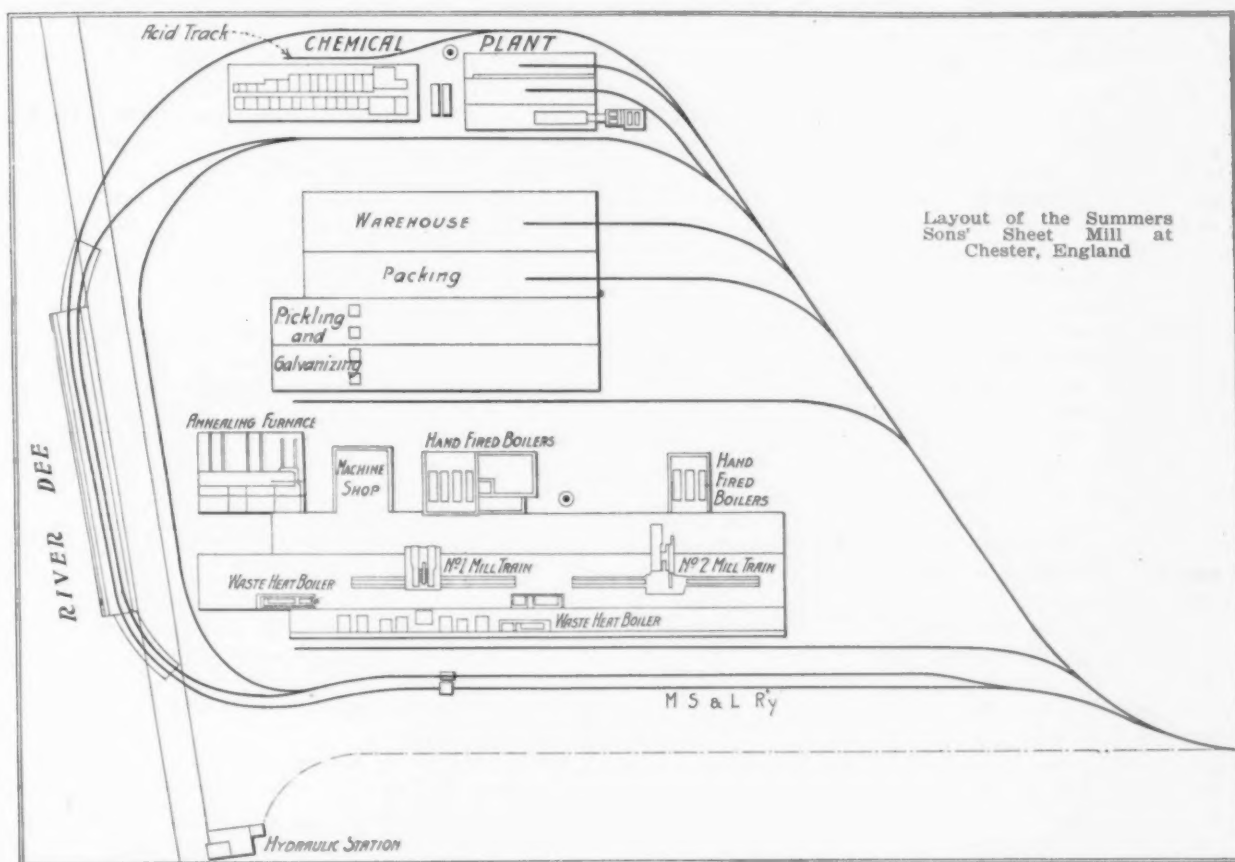
specifications which come within the range of sheets, even to the extremes, and by rolling them on mills unsuited to these outsizes, albeit admirably suited to the general run of business, cut down tonnage with the corresponding increase of overhead charges and loss of profit; whereas a steel plant with a variety of mills will place the light orders in the tin mill and the heavy ones in the jobbing plate mill making a normal profit upon the whole specification.

Difference Between Tin and Sheet Mills

The process of manufacturing sheets considered in detail follows for a certain number of operations very closely that of the manufacture of tin plate with the main exception that sheets are always rolled from heavier bars. In both cases the sheet, or tin bar, is the raw material of the black sheet. In both cases the sequential order of operations follow each other, viz., the shearing of the bars,

justed to the desired length of crop. The third man, called the shearman, throws in the clutch and the shear makes a cut, this operation being repeated until the bar is used up. This method is antiquated, slow and costly in labor, and tends to bend the sheared bar, making it harder to rough them after heating.

There are several modifications of this method such as live roller approach tables and continuously running shears, but they are not on the whole satisfactory. The most modern method is the use of a vertical shear, with automatic stop gage, live roller approach tables and pinch rolls. This apparatus is expensive in first cost, but more than justifies its adoption where investment is not of paramount importance. It will take four or more bars at a time, the bars can be loaded on to the approach table by crane. It only requires two men, and can be run at a comparatively high speed. The men have practically no manual labor to perform, one



heating the bars and roughing the bars now called pairs. Then comes the difference, the doubling shear of the tin mill has no place in the sheet mill and from this point out the operations change.

The bars usually come from the bar mill in 30-ft. lengths, are 7 in., 8 in. or even wider, there is a strong tendency in modern plants to increase the width of the bar and decrease its thickness).

The bar shears are of many types. The cheapest in first cost is the common alligator shear. This requires three men to operate and only handles one bar at a time. The method is to arrange two movable horses consisting of bar iron frames and pipe roller tops on the approach side of the shear, and a movable stop guide on the delivery side. Two men lift a bar to the horses on the approach side of the shear, the bar is then pushed through the gap of the shear until it touches the stop guide on the delivery side. This guide has been previously ad-

straightens the bars on the approach table with a hook and the shearman works the guide and clutch without moving from his position.

The sheared bars now called pairs are ready to be conveyed to the heating furnaces. This is done in many ways by truck hand power, overhead traveling crane, monorail trolley, etc. Local conditions and the size of the mill are the determining factors as to which of the methods is the most desirable.

Heating the Bars and Reheating the Sheets

There are many kinds of furnaces used for this purpose, all having the generic name sheet and pair furnaces.

The oldest type and one still in use is an arrangement of two independent furnaces side by side, one for the bars and one for the sheets. A modification of this is to build the two furnaces together with a separate arch for each springing

from the outside walls and having a common division wall on which both arches meet. This saves one wall and two sets of buckstays.

An advance on this method is the tandem combination sheet and pair furnace; this consists of two furnaces, one behind the other, with a single combustion chamber. The rear furnace is for the bars and the front nearest the mill is for the sheets. Between the combustion chamber and the pair furnace hearth is a bridge wall and between the pair furnace hearth and the sheet furnace hearth is a second bridge wall. The products of combustion pass from the combustion chamber over the bridge wall to the hearth of the pair furnace and after heating the bars pass over the second bridge wall and serve to heat the sheets in the sheet furnace. This is entirely feasible, as the pairs require a considerably higher temperature than the sheets.

This method is a distinct advance on the older methods, effecting quite a considerable saving in fuel and longitudinal floor space, thus saving spindle length in the mill train, but it has the disadvantage of increasing the carry of the heated bars from heater to roller, a very serious matter in hot weather.

Lately a very distinct advance has been made in the art of heating sheet or tin plate bars by the use of the Allis continuous pair furnace. This consists of a cast-iron or steel hearth arranged in V grooves on which the bars are arranged. Behind the furnace a pusher, either hydraulic or electrically operated, is provided, and the bars are pushed through automatically. This insures a very even heating of the bar, reduces the manual labor to a minimum, is economical in the use of fuel and, perhaps most important feature of all, does not require the highly skilled labor called for by all the other types of pair heating furnaces.

In the rolling of the black plate perhaps the most important single operation is the heating of the bars. These must be brought up to the rolling temperature with a slow, even raise of temperature. A sudden heating scales the bars, and this scale is rolled into the pack, spoiling the sheet. Under all the older system the heater had to move his bars from one part of the hearth to another, turn them and edge them; this not only required experience and skill but a very considerable amount of manual labor, during which the heater was exposed to the heat of the open furnace. All this is obviated by the Allis furnace, the bars come through on edge so that they have practically all surfaces exposed to the action of the heated gases. At the end of the V grooves there is a short fore-hearth which heats up any black spots caused by contact with the grooves, and all the heater's helper has to do is to open the furnace door and take out a pair of bars and pass these to the roller, a few seconds' exposure only. The heater simply attends to the pusher and regulates the heat of the furnace by means of his control dampers. These Allis furnaces were illustrated in the author's article on tin plate published in the issue of Jan. 3, and the mill which is the subject of the accompanying plan has the tandem sheet and pair furnaces mentioned.

Arrangement of the Rolls

The mill train, as indicated, has six stands of rolls on one side of the drive and four stands on the other. This refers to finishing mills. This mill is designed for a highly varied product ranging from 36 in. wide and No. 31 gage to 48 in. wide and No. 12 gage.

To take care of this large variation and assuming that rather more than one-half of the demand

would be for short and light sheets, one side of the mill was laid out for these lighter sheets and arranged on the tin mill style, roughing and finishing on the same stand. On the opposite side of the mill there are arranged roughing and finishing stands.

The light side of the mill train has mills arranged as follows: The lead mill, that is the mill nearest to the drive, is 48 in. long on the body; the next is 42 in. and the next four are 36 in. The end stand is a cold mill, that is to say a mill for cold rolling which process is treated later and takes the place of a drag. Its length on the body is 42 in. All the rolls on this side of the mill are chilled.

On the heavy side of the mill the lead mill is 54 in. body length and is a chilled finishing mill. Next to it is a pair of pinions and next again a stand of 54-in. sand roughing rolls, which are balanced and both top and bottom rolls driven, the pinion drive enabling the roughing mill to take bars up to 2 or 2½ in. thick and thus roll out the heavier and longer sheets from a standard 7 or 8-in. bar; the next stand is a 54-in. chilled finishing mill. The next stand is a 48-in. chilled finishing mill and between it and the next is a 48-in. sand jump rougher, and next comes a 48-in. chilled finishing mill followed by a 54-in. chilled cold mill. All the mills are 30 in. in diameter and run at 30 r.p.m.

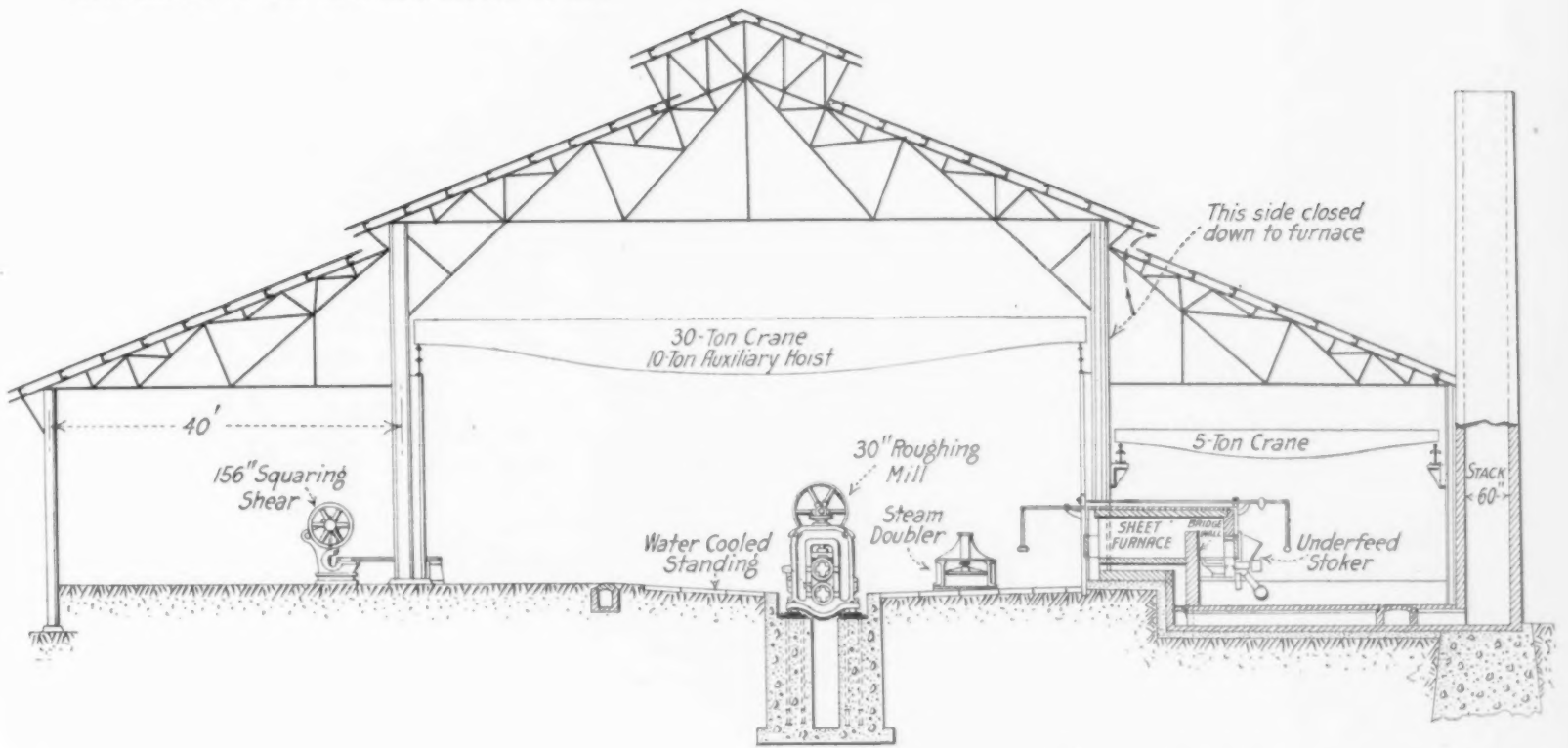
The drive is of various types: Steam engines run at comparatively high speed and connected by means of gearing to the leading spindles. Steam engines run at comparatively high speed and connected to the leading spindles by means of a rope-drive reduction. Steam engines run at low speed directly connected to the leading spindles. Electric motor connected by means of helical cut gear reduction to the leading spindles. All the drives mentioned are in practical and successful use, but all modern mills are being equipped for electric motor drive.

The matter of power is extremely local. If a source of electric power, either hydro-electric or large public distributing station, is available, there can be no question as to purchasing power and using electricity entirely. In a medium to large plant (10 to 20 mills) the first condition not being existent, to generate electricity by turbogenerators is advised and only in small plants is direct steam even partially economical.

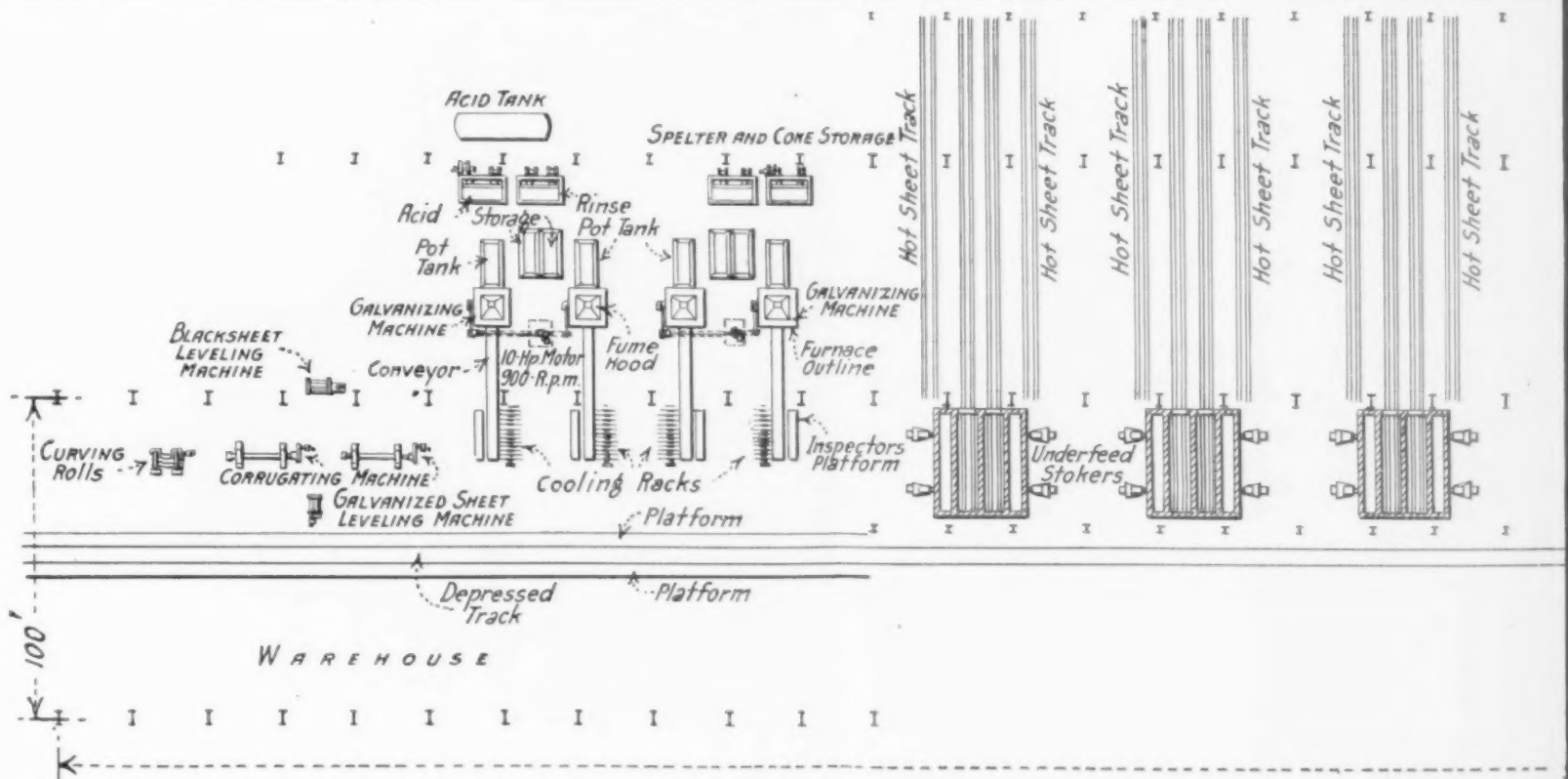
The housings of the mills are secured to heavy shoe plates, which are bolted together to make a continuous bed from drive to end mill on each side. The foundation of the mill train and the drive should be in one mass.

Returning to the heating of the bars. After they are heated to the required temperature they are taken out of the furnace by means of tongs two at a time; the heater throws them to the roller down the standing, which is sloped toward the rolls. The roller takes first one bar and then the other, passing them through the rolls twice or thrice to the catcher, who returns them over the top roll, using its direction of rotation to assist in this operation; after two or three passes, the roller places one of the now embryo sheets on the top of the other and they are given as many passes as the heat, now rapidly diminishing, will allow.

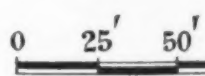
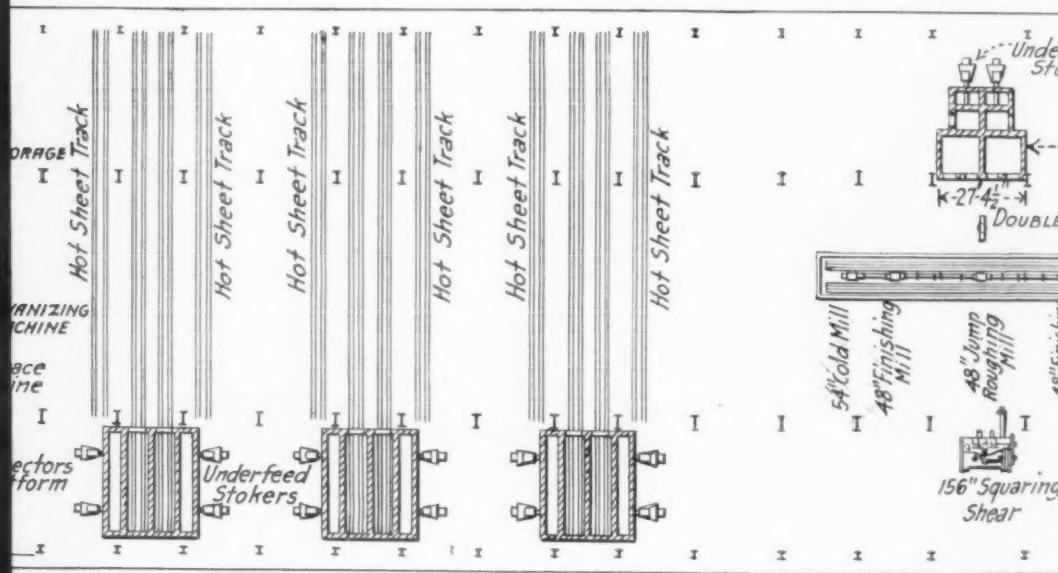
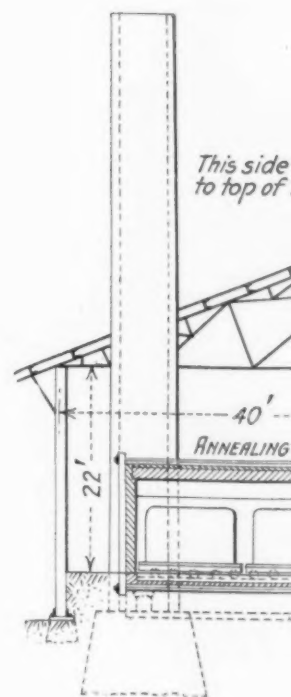
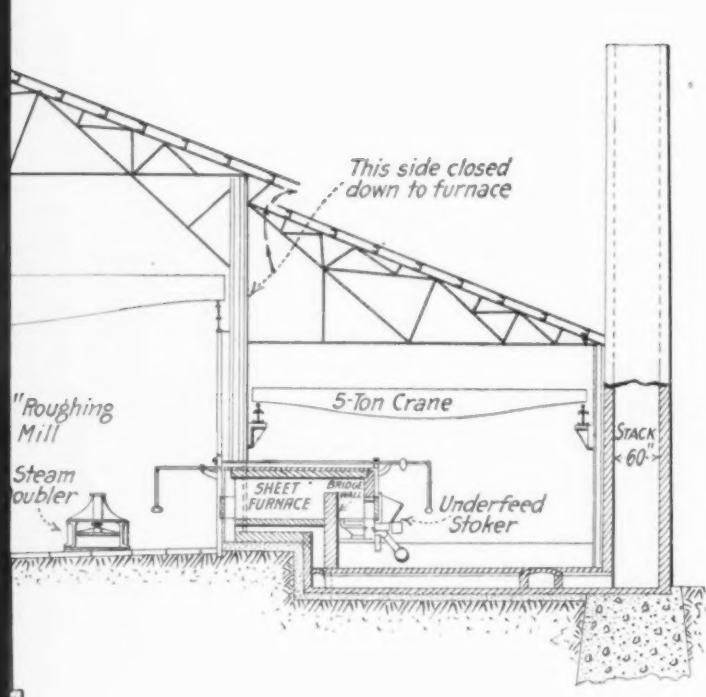
The next stage is reheating. As the sheets cannot be rolled thin enough in two thicknesses (except in the heavier gages) they must now be doubled. This is accomplished by taking one end of the sheet and bending it over. Then a doubling machine, which is a plunger press is used to close down the sheets, one on the other. The result is a pack of four sheets but practically cold. These are next



SUPPLY TRACK

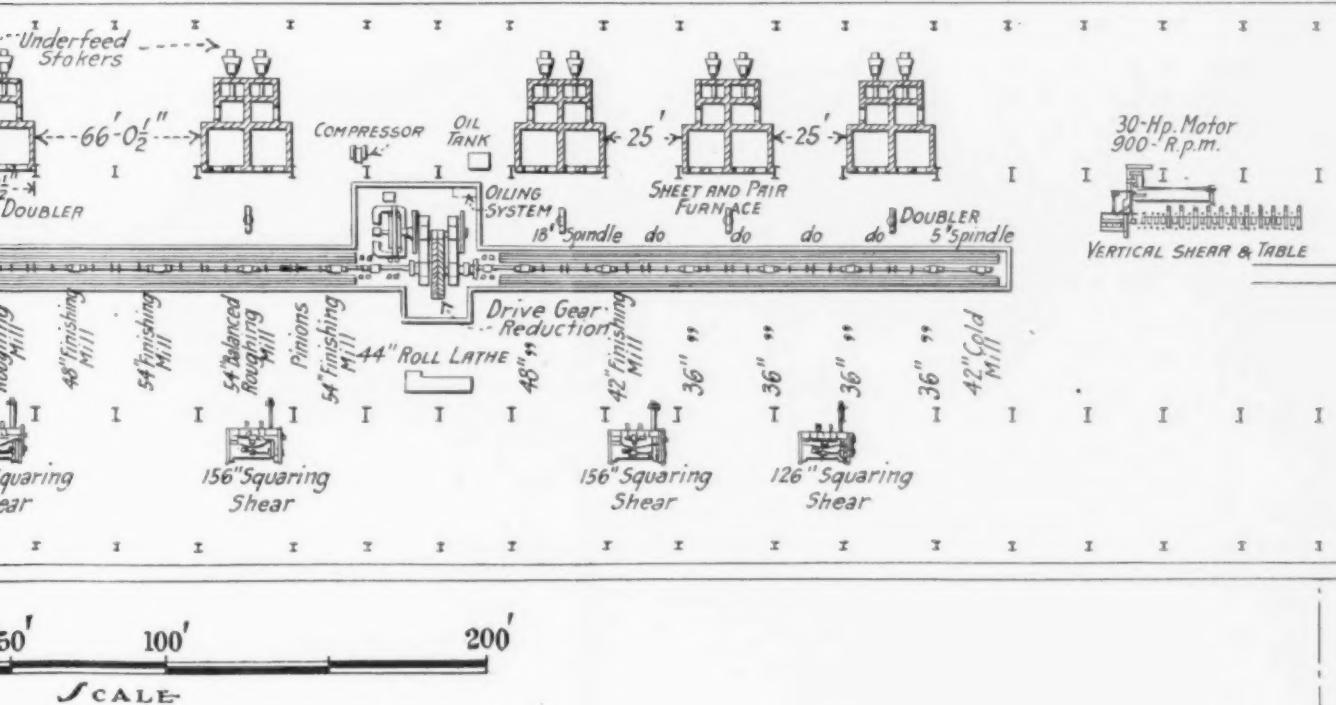
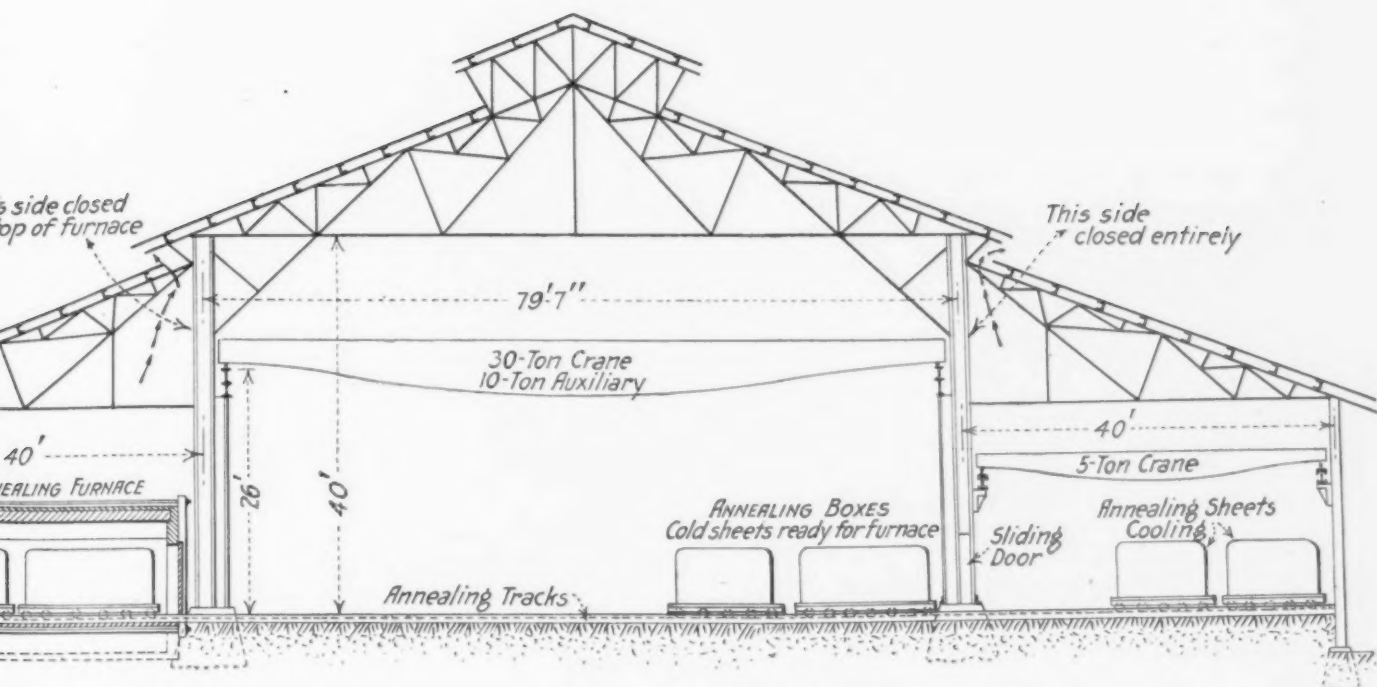


Plan of Sheet Mill and Cross-Sections Thro



----- 986'-0" -----

Plan of Sheet Mill and Cross-Sections Through Rolling and A



and Annealing Departments

placed in the sheet furnace and reheated. When this is accomplished the pack again goes to the roller and is passed through the rolls again and again until the heat is exhausted or the desired thinness is obtained.

A pack of sheets, 4 or more in thickness, of ragged outline and closed at one end, is the final product of hot rolling. The next process is to shear this pack to the size called for in the order. This is done in what is known as a squaring shear (which has an essentially long knife but comparatively little shearing power, about $\frac{1}{4}$ in. of soft steel being the usual capacity). This shear is provided with a system of graduated guides which enable the size of the sheets to be readily fixed by the shear man and precludes the possibility of sheets of one order varying in size.

The pack now has to be opened, that is, separated into individual sheets. If the rolling has been well done at the proper heat, this is a matter of little difficulty. After the sheets are opened the first inspection is given them. This consists largely in a superficial examination for blisters, dirt or scale.

The result of all the processes hereinbefore described is a number of *hard, black* sheets of supposedly uniform size and thickness. These are loaded on bogies or trucks and taken to the annealing furnaces. The scrap is collected, bundled and returned to the open-hearth charging floor, or sold if the sheet mill is being operated independently of a steel works.

Annealing the Sheets

Annealing is of vital importance, and although manufacturers have sold hard sheets in the past, they have not continued the practice.

There are two systems of annealing: Open annealing and close annealing. The former is now almost obsolete. It is performed by heating the sheets in an open muffle furnace to a dull red heat and then piling them on the ground, sometimes covered with sand, and allowing them time to cool off. As before stated, this method is very little used to-day; it saves a little money, sometimes, but does not soften the sheet sufficiently for the working-up quality.

The Matter of Fuel

There are many kinds of fuel in successful use: Gas, natural and produced; coal, hand-fired and stoker-fired, and latterly, pulverized coal. For this latter, great economies are claimed, but it cannot as yet be said to have reached the commercial stage.

Bearing in mind that the primary requisite is slow, even heating and that the final temperature is not high (seldom exceeding 1800 deg. Fahr.), the best method up to the present in commercial use is by means of coal stoker-fired, and the best stokers for the purpose are the underfeed type; in the United States about 80 per cent of all the stoker-fired sheet and pair furnaces in either sheet or tin-plate mills are the American underfeed type, and the same may be said also of annealing furnaces. Close annealing is accomplished in a special furnace which is fired by means of any suitable fuel.

The furnace is essentially a long arch closed entirely at one end and having two doors at the other. It has two bridge walls, two combustion chambers extending the whole length on each side, with a series of checkers in the bridge walls, chambers under the hearth and an underground flue to the stack.

There are provided, as before mentioned, two

sliding doors in front and cast-iron tracks inside. The sheets are piled up neatly on cast-iron stands, great care being taken that so far as is practical one length and width of sheet only goes under each cover. A charge is about 10 to 12 tons per cover. A variety of sizes of covers is kept, it being important to have as little air within the cover as possible, which, of course, is the reason for keeping the sheets as nearly as possible of the same dimensions; thicknesses do not matter so much. When the stand is packed, the cover is placed over the sheets and sand sealed around the bottom edges. The stand and cover are then placed in the furnace.

This is accomplished by means of two V-shaped tracks, one on the under side of the stand and the other laid in the furnace hearth, the V slots in the track being on top while those in the stand are downward. Balls of cast iron are placed in the groove of the track and on these balls the stand and cover travel.

When the furnace (each of which has a capacity of four stands and covers) is charged, heat is applied until the whole mass—stands, covers and sheets—is red hot; the fire is then reduced, but the sheets are allowed to remain in the furnace for a few hours, the last of which, the fire is banked down. The stands, boxes, etc., are then withdrawn and others take their places. The annealed sheets are allowed to stand with their covers on for 24 hr., after which the covers are removed and the sheets allowed to stand until cold enough to handle and are then unpacked and distributed. If they are to be shipped black, close annealed only, they are ready for final inspection. If they are to be shipped cold rolled, close annealed, they are ready for cold rolling.

The annealing furnace layout as illustrated has many features to recommend it. The system of double tracks make it possible to take the hot sheets after they are drawn from the furnace from the ingoing track to the hot-sheet track (this is accomplished by means of the crane) and remove them into the lean-to to cool, thus greatly reducing the temperature of the mill proper and increasing the comfort of the men.

Cold Rolling

The process of cold rolling consists of passing the annealed sheet through a pair of rolls exactly similar to the hot rolls, but without re-heating the sheet. Sheets are ordered either one, two or three pass cold rolled, which means that they are passed through the cold mill one, two or three times. This process finishes the sheet, which, as it comes from the annealing furnace, has burrs or fins on all its edges, caused by the shear knives, and all the pores are open, the result of the heat treatment in the annealing furnace. The cold rolling closes these, planishes the sheet and removes the burrs. It may be noted here that cold rolling slightly hardens the sheet again, which, of course, is another argument in favor of thorough annealing. It is evident that sheets of the working-up quality cannot be shipped unfinished, and as finishing hardens the sheet it is necessary to make it really softer than it will be when finished for shipment.

(To be continued)

The business of J. J. McCabe in the buying and selling of new and used machinery has been incorporated as the J. J. McCabe Lathe & Machinery Corporation with headquarters at 149 Broadway, New York. J. J. McCabe is president; H. P. McCabe, vice-president; J. J. McCabe, Jr., treasurer, and P. F. Sheeran has been made secretary.

Greater Use of Domestic Manganese Supply

Brazilian Ore Deteriorating — Low Grade
American Ores—One American Company Solves
the Problem — Germany and the Ukraine

BY F. LYNWOOD GARRISON*

AS there seems to be a somewhat confused understanding regarding the manganese ore supply for this country, and in view of the importance of this material as a vital factor in the operation of our enormous steel industry, the subject has assumed a seriousness which must command our best thought and consideration if we are to maintain our normal steel production and also meet the extraordinary demands of these critical times.

Domestic Manganese Ore Output and Needs

In a statement prepared by the writer in April, 1917, for the Department of Commerce, he estimated the probable needs of our industries for the year 1917 at 720,000 gross tons of high-grade manganese ore. Of this amount, he stated, we could expect the United States to produce not over 80,000 tons. The difference would, of course, have to be imported in ships from overseas either as raw ore or as ferromanganese containing about 80 per cent manganese; in other words, we would be able to supply from our own territory only about 11 per cent of our requirements.† According to THE IRON AGE of Feb. 7, 1918, the total imports of manganese ore for the year 1917 were 629,972 tons, an average monthly rate of 52,498 tons as compared with 48,027 tons in 1916. The domestic production up to Oct. 1, 1917, was 70,225 tons, and for the year the output has been estimated by the U. S. Geological Survey at 122,275 tons, which, added to our importations gives 742,247 tons as our total consumption.

Russian, Indian and Brazilian Ores

Before proceeding further, it may be well to review briefly a few facts which are by no means well known. Prior to August, 1914, a considerable proportion of our manganese ore importations came from the Tchiatouri district in the Caucasus Mountains of Russia not far from the port of Poti on the Black Sea. This town is also the western terminal of the railroad and pipe lines that connect the center of the oil-producing region at Baku on the Caspian Sea, with its European market via the Black Sea and Constantinople. This Russian ore is perhaps the best in the world and averages as shipped about 51 per cent manganese. It is soft, exceptionally pure, and the Tchiatouri deposits alone are estimated to contain about 110,000,000 tons; hence it would be difficult to overestimate the importance of that region.

In 1914 our importations from Brazil and India were somewhat over 200,000 tons, about equally divided between the two countries. The Indian ores have always maintained a high standard of excellence, whereas the Brazilian have showed a continued deterioration in grade. The bulk of the Indian ores go to England and the Brazilian chiefly to the United States. During the years 1913 and 1914 the production of Brazil showed a tendency to

fall off, whereas the yield from India rapidly increased by virtue of the English demand and the local needs of a steadily developing steel industry in India itself.

At the outbreak of the war certain American firms had large stocks of Tchiatouri ore left on their hands in Russia owing to the closing of the Dardanelles. Had the Russian Government not later taken them off their hands, a heavy loss would have been experienced. The Germans, knowing what was coming, had accumulated large quantities of this ore in their own country and were preparing to make sure of a future supply by purchasing control of many of the Tchiatouri properties under the guise of Swedish companies. It is well known that the Germans have been in serious need of manganese these last two years and that various expedients of a metallurgical character have been tried to overcome the difficulty. We have no means of knowing how successful they have been.

Ukraine and the Germans

It is perfectly plain that the opening up of the Ukraine region to the Germans is a matter of tremendous importance, for it not only affords them the food and coal resources of that rich region, but will give them virtual command of the Black Sea, the mineral resources of the Caucasus and the Caspian oil wells. Should such an impending catastrophe be consummated, it will be the worst disaster that has befallen the Allied arms. Even should by chance the German control not reach the Caucasus, there is enough manganese in the Ukraine to supply their needs for a long time. Near Nikopol on the Dnieper River about a hundred miles from its entrance into the Gulf of Odessa, there is said to be large deposits of fairly good ore sometimes containing as much as 50 per cent manganese; the phosphorus content is 0.25 per cent, which is rather high, as is also the silica content of 12 to 15 per cent.

It would seem at this writing that if the Russians fail to replace their present wild, chimerical democracy by a liberal monarchy suited to their primitive development and in line with, but of better character than the government to which they have been accustomed for centuries, economic if not political submission to Germany is inevitable. In Russia there is no middle or bourgeois class, the hope of this potentially the richest country in the world, is in the hands of the landed aristocracy and its great body of unspoiled, hardy and virile peasantry. Natural resources, however, are valuable only when in the possession of a progressive and masterful people, otherwise they determine nothing in human affairs.

The Russian People

Have the Russians these qualities? Their history tends to show that they have. No one who has seen the Russian peasant in his home will believe for one moment he is the kind of man to submit to the oppression German dominion or domination would inflict upon him. The Bolsheviks are

*The author is a Philadelphia mining engineer and is chairman of the sub-committee on manganese of the War Minerals Committee appointed on the initiative of the Bureau of Mines.

†As a matter of fact, according to the latest returns on estimates, this percentage should be about sixteen.

for the most part the misguided of an exotic factory system and the scrapings of the Ghetto. The former no more represents the true peasant than do the latter the hard-working and peaceful Jew. The marvel is that such trash could obtain even temporary power, but a historical parallel is probably to be found in the French Revolution. The Russian aristocracy is and always was distinctly pro-French, whereas the bureaucracy of the old Imperial Government was pro-German. The core, the hope, of the present situation is the peasantry and their natural leaders, the landed gentry. If this expectation and view is sound, and I feel sure it is, Russia will redeem itself and drive the wiley, detested Teuton from the country. These remarks may appear irrelevant, but in fact and logically they are not, if what affects Russia in the present state of international equilibrium is vital to us all.

The Brazilian Mines Deteriorating

Up to the year 1917 the grade of both the Brazilian and Indian ores imported into this country was maintained pretty close to 50 per cent manganese. But while the Indian ores have shown little or no deterioration in this respect, those from Brazil have steadily fallen off until now anything over 40 per cent manganese is acceptable. Many old, abandoned mines in Brazil have been reopened, and in the state of Bahia an entirely new district in the Jacobina Mountains about 300 miles northwest of the city of Bahia, has been developed by Americans and is shipping some good ore to this country despite serious local difficulties in transportation and dock conditions.

The resources of the old manganese mines in the state of Minas Geraes are probably now being strained to maintain the present output, and very few new properties have been discovered and developed in this state, hence a marked decrease in production may be expected in the near future. Most of the Indian ore goes to England and the output seems likely to be well sustained, for, as previously intimated, the local demand in India promises to increase steadily, whereas there are no domestic requirements whatever in Brazil.

In view of the conditions thus reviewed and the seemingly hopeless prospect of finding any large amount of high-grade manganese (40 per cent and better) ore in this country, it behooves us to see if the problem of our requirements cannot be solved in some other way than by importations overseas from far distant points.

The American Problem

Our present steel manufacturing practice is based upon the use of 80 per cent ferromanganese and it is a very serious matter to expect the steelmaker to change his ways in this respect. The furnaceman, in order to produce this 80 per cent alloy, demands 50 per cent manganese ore, although he does not always get it. Lower grade ore means more fuel; moreover, the normal loss of manganese in the slag and by volatilization is always large. As the supply of low-grade manganese ores (those containing less than 40 per cent) is substantially unlimited and the yield of high-grade comparatively negligible in the United States, it is evident that if our imports are cut off from lack of ships or for any other reason, either our steelmakers must adjust their practice to the use of iron-manganese alloys containing much less than 80 per cent manganese or else the ferromanganese furnaces will have to convert lean ores into the generally accepted standard 80 per cent ferromanganese.

At least one large steel company has successfully solved this complex problem and no doubt others can do likewise when forced to it.

The Low Grade Ore Supply

Our low-grade manganese ore supply is chiefly in the West and has been but slightly developed. We know, however, that as a whole it is enormous, although occurring at a number of rather scattered localities. It is not my purpose, nor is it expedient, to go into details either as to the character of this ore supply or the methods by which it is proposed to utilize it. It may be said, however, these ores are different as a class from the well-known "clay-bank" type of Virginia, Georgia and Arkansas, which are usually susceptible to a washing and concentrating treatment that results in a high-grade manganese product as good as any other in the world.

Nor are the Western low-grade ores like the so-called manganiferous iron ores of the southern Appalachians, which usually must be washed or in some manner beneficiated before becoming fit for the furnace. The possible supply of manganese and manganiferous iron ores from these "clay-ore banks" is relatively small. Moreover, they are expensive to work and in normal times often do not pay the cost of operation. There is a notable exception, however, to this drawback. In Virginia, at any rate, especially in the Shenandoah Valley section, there are a number of clay-ore deposits from which by suitable treatment it is possible to obtain a manganese ore of the greatest purity suitable for chemical purposes and dry-cell electric batteries.

Virginia and Southern Mines

The present concentration methods at most of the Southern mines leaves much to be desired. While a considerable quantity of this desirable chemical ore is being produced, better methods of treatment and closer attention to both the mining and milling practice could not fail to greatly increase the yield, moreover, the necessary additions to plant in most cases need not be either extensive or expensive. On the whole, the mills and manganese washeries in the South are deplorably crude and wasteful, the legacy of times and conditions when 50 per cent manganese ore was worth only \$10 or \$12 per ton and very different from the present.

While it seems proper the public should realize the truth of the manganese situation as affecting the whole country, there is little need to worry if immediate steps are taken to cope with it. The writer feels perfectly sure we are fully capable of doing this; moreover, there are accumulated stocks in this country of both imported ore and ferromanganese sufficient to meet all our needs for many months to come. [While indefinite, this statement suggests a longer period than facts in possession of THE IRON AGE would indicate.—EDITOR.] And even were all the steamships taken from this trade, considerable ore will reach here from Brazil in sailing vessels.

Co-operative Action Necessary

The important thing is to get co-operative action between the steel works themselves on the one hand and the Government on the other. The low-grade manganese ores in the West are for the most part undeveloped. Capital is needed for that purpose but private initiative will hesitate to make such an investment, for there is no guarantee that under

post-bellum conditions such operations may be made to pay, once the flow into our Eastern ports of high-grade, cheaply mined foreign ores is resumed. The Western ores will always be handicapped by the long railroad haul to the Eastern steel works and furnaces, and while such a differential is of no consequence under present abnormal conditions, it becomes a serious matter when they will have to meet the competition with better ores from abroad.

Practice Can Be Changed

There are a few metals such as platinum and tin we can never hope to produce in any considerable quantity from our own territory, but it is not so with manganese. We have only to change the technique of our furnace and steel works practice to meet a new condition; there is no reason whatever to assume this difficulty cannot be wholly and successfully coped with. Indeed, there seems to be no alternative if we are forced to depend wholly upon our own resources. If this problem is solved successfully at one plant, [Referring probably to a Western works.—EDITOR], surely it is not too much to believe it may be done at all of them. When private capital is invested in the development of these now latent mineral resources, it should, in view of the circumstances, at least be exempted from excess taxation if not actually subsidized by the Government. It would seem logical that a vital public need ought to be provided at the risk of the public purse. The danger of loss is not now but after the war.

We will need more and more steel in a constantly increasing ratio as the war goes on, and, while the demand probably will slacken with the advent of peace, the tremendous amount of reconstruction this racked and torn world will then need, gives no promise for any lessened draft upon the products of our mines and mills.

Steel Ingot Production for February Shows Increase

The American Iron and Steel Institute has compiled statistics of steel ingot production for February, as reported by 29 companies, which made 88.14 per cent of the ingot production in 1916. The figures are given below and comparison is made with the returns from the same companies by months beginning with June, 1917, all in gross tons:

	Open-hearth	Bessemer	All other	Total
June, 1917	2,265,772	809,552	8,605	3,083,929
July	2,152,479	777,171	9,465	2,939,115
August	2,251,013	863,873	8,331	3,123,217
September	2,195,556	770,064	6,639	2,972,259
October	2,475,754	870,494	5,687	3,351,935
November	2,384,218	772,489	9,550	3,166,257
December	2,195,832	524,084	13,806	2,733,722
January, 1918	1,763,356	429,588	10,901	2,203,845
February	1,812,393	454,457	14,051	2,280,901

It will be noted that while the January output was 530,000 tons, or about 20 per cent, less than that of December and more than 33 per cent less than that of October, which was the record month of 1917, the production for February shows an increase of 76,056 tons over January, or about 3½ per cent. Assuming that the unreported production in February was in same proportion of the total as in 1916, the February, 1918, ingot production of the country was 2,587,816 tons. That would be at the rate of 31,054,000 tons a year, whereas the ingot production in 1917 was nearly 42,200,000 tons.

Machinists and helpers at the Fore River Works, Bethlehem Shipbuilding Corporation, Quincy, Mass., at a meeting March 6, began the formation of a union to support demands upon the Shipping Board for an increase of wages. The men seek \$6 a day for machinists and \$4.50 a day for helpers, with an 8-hr. day.

CANADA'S WAR SUPPLIES

Output of Munitions Very Large—Making Airplanes Rapidly

The Imperial Munitions Board, Ottawa, has placed orders in Canada for \$1,100,000,000 worth of munitions, according to a report by the Hon. Newton Rowell, president of the Privy Council. On these orders \$875,000,000 has already been expended in the Dominion, outside of Prince Edward Island. Between 500 and 600 munitions plants in the Dominion have in the past employed from 250,000 to 300,000 workers, including as many as 35,000 women at one time, and approximately 5000 women are now engaged on munitions work. Canada has machined over 53,000,000 shells, 40,000,000 brass cartridge cases of 3½ lb. each, and 58,000,000 copper bands. Last summer the Dominion's production of one projectile reached 50 per cent of the total number used by all the armies of Great Britain on all fronts. When Canada first commenced the manufacture of shells, the fuses were made in the United States because American manufacturers were considered better able to produce them, but later on orders were placed at home, and in a short time fuses were turned out at the rate of 2,750,000 per month of such excellent workmanship that, it is stated, the Imperial authorities went out of their way to congratulate the Imperial Munitions Board.

The output of explosives has steadily increased and the refining of zinc, copper, lead and molybdenum has also been greatly enlarged and is going on steadily.

Canada is now rendering assistance to the United States in the production of munitions, and is reported engaged on such orders for 7,000,000 shells, 10,000,000 forgings and 2,000,000 cartridge cases. Canada is now producing more than 300 airplanes per month as well as supplying all the planes used by the Royal Flying Corps in 500 encampments, and also supplying some planes to the United States. There are under construction in the Dominion at the present date 1000 high-grade airplane engines. The sum of \$10,000,000 has been spent on airplane plants and aerodromes in Canada.

The shipbuilding industry in Canada has also greatly increased since 1914. Orders have been placed in the country for 350,000,000 tons of steel and wooden ships which will cost \$64,000,000, and the Dominion Government is now developing an extensive shipbuilding programme. Many of the ships being constructed will be government owned. This year it is planned that more than eight times the tonnage produced the year before the war broke out will be launched. Canada's production of ships this year, it is reported, will be more than one-quarter of the commercial tonnage built in the United States, and more than one-fifth the commercial tonnage built in Great Britain last year.

Request for Higher Wages

At Springfield, Mass., the local machinists' union has sent letters to 42 manufacturers asking for an increase of 20 per cent in wages. The machinists claim that the prevailing rate of wages for toolmakers in the city is between 40c. and 50c. an hour and for machinists the average is about 45c. an hour, and that in other cities the rate runs as high as 72c. an hour. The letter, which follows in part, is carefully phrased in the form of a request instead of a demand:

We, the committee, would be pleased at any time to have a conference with your officials on this proposition.

We are presenting to you this request instead of a demand in order to have the best of relations exist at this particular time, with our country at war, and its need of production; and we believe that no matter how prejudiced you may be against organized labor, this form as a request may meet with your approval, and receive consideration at your hands.

"Coal: The Resource and Its Full Utilization" is the subject of Bulletin 102, Part 4, of the Smithsonian Institution, Washington. The authors are Chester G. Gilbert and Joseph E. Pogue.

Decline in Iron and Steel Imports

WASHINGTON, March 12.—Imports of iron and steel declined nearly 70 per cent in January, 1918, as compared with the same month of 1917, according to official figures compiled by the Bureau of Foreign and Domestic Commerce. The reduction in imports for the seven months ended January as compared with the corresponding period of 1917 was approximately 40 per cent. The big drop in imports of January of this year was due to reduced importations of ferromanganese, other pig iron and scrap, which more than offset moderate gains in imports of steel billets without alloys, structural iron and steel, and steel rails.

The following table shows the imports of iron and steel for January and for the seven months ended January, 1917 and 1918:

	January		Seven Months	
	1917	1918	1917	1918
	Gross Tons	Gross Tons	Gross Tons	Gross Tons
Ferromanganese	6,211	1,050	49,356	15,835
Ferrosilicon	891	389	4,075	4,598
All other pig iron.....	2,326	53	30,601	14,198
Scrap	28,066	4,226	114,431	46,791
Bar iron	47	5	3,895	1,710
Structural iron and steel...	197	879	664	6,542
Steel billets without alloys..	1,421	4,566	3,797	25,878
All other steel billets.....	462	282	8,543	5,604
Steel rails	271	822	10,596	6,343
Sheets and plates.....	265	108	1,094	1,017
Tin and terne plates.....	31	518
Tin scrap	367	5,206
Wire rods	3	128	2,063	1,164
Total.....	40,191	12,875	229,633	134,886

Imports of Manganese Ore and Oxide			
	1917	1918	
Manganese, ore and oxide of	49,530	42,947	388,828 356,129

It will be noted that there were no importations of tin or terne plates in January or in the seven months ended January, 1918, although there were substantial receipts of tin scrap. The imports of tin and terne plates have been negligible since the beginning of 1917.

Rushing Work on Ford Plants at Detroit

DETROIT, March 14.—More than 6000 men are rushing toward completion the Ford Motor Co.'s blast furnace and shipyard projects in the down river district of Detroit—projects which will eventually involve \$20,000,000 and employ from 20,000 to 30,000 men. Temporary buildings are being put up, the River Rouge being dredged and straightened, and the first steel work of the permanent factory structures being erected.

The blast furnace plant will cover 350 acres and will have four stacks with a byproduct coke plant. It is planned to have two furnaces in operation by next year. Among the buildings which will be constructed will be an administration building, 175 x 175 ft.; laboratory, 175 x 175 ft.; byproduct plant, 1000 x 1000 ft.; power house, 300 x 440 ft.; machine shop, 200 x 1000 ft.; foundry, 275 x 1000 ft., and a cleaning shop, 100 x 1000 ft. The storage yards, two for ore and two for coal, will be 500 x 1530 ft.

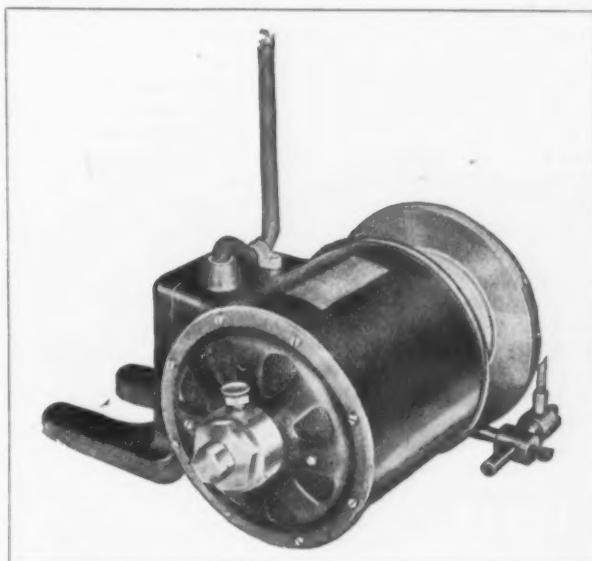
The byproduct plant will be operated and owned by the Semet-Solvay Co., Detroit. The Ford company has entered into an agreement with the Semet-Solvay Co. whereby the latter will occupy a part of the blast furnace property, reducing the coal to coke and taking out all of the byproducts, also furnishing the Ford factory with gas.

The entire construction plan is in the hands of W. B. Mayo, chief engineer of the Ford Motor Co. G. R. Thompson, superintendent of construction at the Ford Motor Co., is directing the construction work on the site. J. W. Gray, resident engineer for Julian Kennedy, the Pittsburgh engineer, is supervising the installation of the four blast furnaces.

The American Radiator Co., Titusville, Pa., has awarded a contract for the erection of a new one-story foundry, 80 x 100 ft., to cost about \$25,000.

Electric Toolpost Grinding Machine

A portable toolpost grinding machine intended for use on lathes has been brought out by the Gilfillan Brothers Smelting & Refining Co., Los Angeles, Cal. It is kept in place by an angle plate which can be clamped around the toolpost, and a vertical adjustment



Tool, Internal and Tooth Grinding Are Possible with a New Electric Machine Designed for Clamping around the Toolpost of a Lathe

of the machine is provided. A wheel 6 in. in diameter with a $\frac{3}{8}$ -in. face is used and is driven by a Westinghouse $\frac{1}{4}$ -hp. motor at a speed of 3400 r.p.m. The equipment provided includes an extension mandrel for internal grinding fitted with a $1\frac{1}{2}$ -in. wheel, a tooth rest for cutter grinding and an electric attachment plug with $7\frac{1}{2}$ ft. of cord.

The company is also manufacturing a portable drilling machine equipped with gears to give two speeds, a knob on the bottom of the gear case providing for the changes. The gears which provide speeds of 400 or 700 r.p.m. are of chrome nickel steel and run in grease. Ball bearings are employed throughout and a $\frac{1}{2}$ -in. chuck is a part of the equipment.

Higher Prices for British High Speed Steel and Bar Iron

A substantial advance in the official maximum prices of British high-speed steel came into operation on Feb. 1. The previous maximum rates were fixed two years ago at 2s. 10d. per lb. for steel containing 14 per cent tungsten; and 3s. 10d. per lb. for steel containing 18 per cent tungsten, and the manufacturers were allowed to charge 3d. per lb. additional on material for export. The new prices are 3s. 8d. per lb. for 14 per cent and 4s. 5d. per lb. for 18 per cent high-speed steel, the charges for extras remaining as before. The advance is said to be justified by the increase in the costs of tungsten and other alloys and of Swedish iron, and by the enhanced production and maintenance costs, besides which the hurried manner in which steel has to be put through the hammering and rolling processes causes a much greater percentage of wastage than would be incurred normally. The makers were therefore able to convince authorities that the manufacture of high-speed steel at the old prices did no longer pay. For a long period a government department has rationed tungsten to the users at 5s. 6d. per lb. for ferro-tungsten, and 6s. 3d. per lb. for tungsten powder, but on Jan. 20 it was found necessary to advance these rates to 6s. 2 $\frac{1}{4}$ d. per lb. for the former, and to 6s. 8 $\frac{1}{2}$ d. per lb. for the latter variety.

Bar iron maximum prices have also been advanced. Standard quality, ordinary sizes and merchants' lengths have been raised 2s. 6d. per net ton, f.o.t. makers' works, and now stand at £13 17s. 6d.

FOUNDRY SAFETY CODE

Conflicting Regulations to Be Eliminated by Agreement of Foundry Associations

A SAFETY code has been prepared by joint committees of the American Foundrymen's Association and the National Founders' Association. Favorable action has already been taken on it by the National Founders' Association and by the Committee on Safety, Sanitation and Fire Prevention of the American Foundrymen's Association. It is now before the individual members of the latter association for their approval.

Proper light and a minimum temperature of 50 deg. Fahr. during working hours are specified. Strict observance in use of goggles, helmets, etc., in addition to proper arrangement of surroundings to guarantee the personal safety of the workers, is required in all finishing operations. The employment of females is limited to those of normal height, size and weight and it is prohibited that they shall lift more than 35 lb. even by mechanical means.

General recommendations are made for safeguarding machinery, stairways and passageways. The fostering of accident prevention through the personal interest of the foreman is strongly advised, and it is specified that first-aid kits equivalent to the full Naso complement of medicine, bandages, etc., shall be always on hand. A room kept in sanitary condition shall be provided for employees' use to eat their meals.

Entrances, Floors and Galleries

The regulations governing the layout of the foundry are substantially as follows:

Entrances to foundries in cold climates shall be protected during winter by a covered vestibule so constructed as to eliminate harmful drafts, and still allow for the passage of wheelbarrows, trucks and industrial cars. Entrances for railroad or industrial cars handled by locomotives, or for traveling cranes, horse-drawn vehicles or automobiles may remain open during winter only for such time as is necessary for ingress and egress.

The floor beneath and immediately surrounding a cupola shall be kept free from collection of water, and near industrial tracks over which workmen frequently pass, shall be hard and flush with the top of the rails. All pits or openings located in foundry floors shall be guarded by suitable covers or railings or by watchmen. Galleries where molten metal is poured into molds shall be provided with a solid partition not less than 3 ft. high, installed on the open side of the gallery.

Gangways

The term "gangway" shall mean a well-defined passageway dividing the working floors of foundries, and shall be the clear distance between molds, posts, partitions or other obstructions on either side of the gangway. For other than carrying molten metal they shall be of sufficient width and properly illuminated to safely allow the passage of employees and materials. They shall be kept free from obstruction at all times.

Gangways in which molten metal is handled shall, during the progress of casting, be kept in good condition, clear of obstructions and free from undue dampness. Where molten metal is carried in crane, trolley or sulky ladles, they shall be sufficiently wide to allow employees safely to handle and empty the ladles; where molten metal is carried on truck ladles, not less than 18 in. wider than the extreme width of the ladle; where metal is carried in crucibles by not more than two men per crucible and poured into molds placed on one or both sides, not less than 3 ft. wide; where carried in crucibles by more than two men per crucible and poured into molds placed on one or both sides, not less than 4 ft. wide; where carried in hand or bull ladles by not more than two men per ladle and poured into molds placed on both sides, not less than 4 ft. wide; where carried in hand or bull ladles by not more than two men per ladle and poured into molds placed on only one side, not less than 3 ft. wide; where carried in hand or

bull ladles by more than two men per ladle, not less than 5 ft. wide.

The term "aisles" shall mean a passageway between molds leading from the gangway. Aisles where molten metal is carried in hand or bull ladles or crucibles and poured into molds on individual floors by not more than two men per ladle or crucible, shall be not less than 12 in. wide except where molds alongside the aisle are more than 20 in. above the aisle level, in which case the aisle shall be not less than 24 in. wide; where metal is carried in hand or bull ladles or crucibles and poured into molds on individual floors by more than two men per ladle or crucible, it shall be not less than 36 in. wide; where carried and poured into molds on individual floors by cranes, trolley or sulky ladles, it shall be sufficiently wide to allow employees safely to handle and empty the ladles.

Foundry Equipment Designed for Safety

In addition to provisions for safe types of vessels for carrying and casting molten metal, provision is made that when crucible, molten metal and crucible tongs exceed 100 lb., it shall be removed from the furnace by not less than two men or by mechanical means; and when the combined weight exceeds 300 lb., three or more men or mechanical devices shall be employed.

Where the crown plate of an upright crucible furnace is over 12 in. above the floor, the furnace shall be equipped with a platform having a standard metal or other fireproof rail, and shall extend along the front and sides of the furnace, flush with the crown plate, and shall be at least 4 ft. in width, and shall be clear of all obstructions during pouring time. If the platform is elevated above the floor in excess of 12 in. the lowering from it of a crucible containing molten metal shall be by mechanical means.

The practice of riding chain and crane loads shall be prohibited. Swinging or dangling crane chains must clear all possible obstructions when the crane is in motion or they must be guided by chainmen walking beneath.

Trunnions on flasks shall be specially designed for the loads they are to handle, and constructed with a factor of safety of at least 10, including bolts. The diameter of the button shall be equal to the diameter of the groove plus one and one-half times the diameter of the sling used to handle the flask. Inside corners shall be well filleted and in order to prevent the sling slipping off or riding the button, the radius of the corner between groove and button shall be approximately equal to the radius of the sling used, the remainder of the inside edge of the button to be straight. All slings used to suspend flasks from jib crane beams shall either be designed so that there are safe clearances for a hand grip or handles shall be provided to hold the sling. All ladles, ladle shanks, crucible shanks, crucible tongs, yokes, skimmers, slag hoes, crane chains, cables, ropes and slings used in handling or pouring of molten metal shall be inspected daily in regard to their safe condition by the men preparing and using such appliances. A monthly inspection in regard to the safe condition of all crane chains, cables, ropes and slings used for suspending molten metal in mid-air shall be made by a man designated by the employer for the purpose. Written report of such monthly inspections shall be kept.

Finishing and Cleaning

All tools shall be kept properly dressed and free from mushroomed heads. Electric arc welding shall be properly inclosed to prevent egress of light rays, when carried on during working hours. Such inclosure shall be properly ventilated. The use of high explosives or of a drop for breaking scrap shall not be permitted unless done under reasonably safe conditions.

Ventilation

The importance of good ventilation is indicated by the following provisions:

Every foundry shall be so ventilated during working hours that smoke, gases, fumes or dust injurious to the health of employees shall, as far as practicable, be rendered harmless by means of natural circulation of air or by ventilating hoods, fans or other effective

devices. Where the operation of drying ladles causes fumes or gases injurious to the health of the employees within the foundry, ventilating hoods shall be provided to remove such fumes or gases. All ovens from which fumes or injurious gases escape shall be provided with hoods of sufficient capacity to remove such fumes and gases.

No locomotive while discharging smoke shall remain inside a foundry during hours except as required for its entrance and exit; but this regulation shall not apply to locomotive cranes or steam charging machines.

No foundry in which zinc-bearing metals are melted or poured shall hereafter be installed in a room less than 14 ft. minimum clearance from ceiling to floor, except that where the roof is of peak, saw-tooth, monitor or arch construction, the minimum height of the side walls may be 12 ft. If such foundry is installed in the front part of the building the ceiling shall be in every part not less than 6 ft. 6 in. above the curb level of the street in front of the building, and if such foundry is installed entirely in the rear part of a building or extends from the front of a building to its rear, the ceiling shall not be less than 3 ft. above the curb level of the street in front of the building and the foundry shall open on a yard or court which shall be not less than 6 in. below the level of the floor. If after this safety-code is approved the operation of any foundry in which zinc-bearing metals are melted or poured shall be discontinued for not less than 15 consecutive days, it can thereafter be reopened for the same purpose only by complying with the foregoing provisions.

The members of the committee on safety, sanitation and fire prevention of the American Foundrymen's Association who have approved the code are as follows: Victor T. Noonan, chairman, director of safety, Industrial Commission of Ohio, Columbus; George B. Koch, Pennsylvania Railroad, Altoona, Pa.; Dr. Richard Moldenke, Watchung, N. J.; Earl B. Morgan, Norton Co., Worcester Mass.; Thomas J. Soultz, Sill Stove Works, Rochester, N. Y.; Ralph H. West, West Steel Casting Co., Cleveland; W. G. Kranz, National Malleable Casting Co., Cleveland and F. H. Wentworth, Fire Prevention Bureau, Boston. One voted against adopting the code and one member did not vote.

A New End Suction Type of Centrifugal Pump

A centrifugal pump having a capacity of 45,000 gal. per min. against a head of 20 ft. has been recently built by the Wheeler Condenser & Engineering Co., Carteret, N. J. The pump is driven at a speed of 240 r.p.m. by a steam turbine through a 10 to 1 ratio of gear transmission. The particular distinguishing feature about this pump is the location of the suction opening, which is directly beneath and parallel to the end bearing. This arrangement, it is pointed out, places the suction opening out of the way, but still in a convenient position for the erection men and for inspection and repair purposes. The placing of the suction opening in this position, too, it is emphasized, enables the pumping unit to be placed in a room which has a considerably smaller ground area than would be the case were the suction end located opposite the outlet as in a general case. Other advantages are the elimination of elbows, a reduction in the length of piping and ease of making of pipe connections.

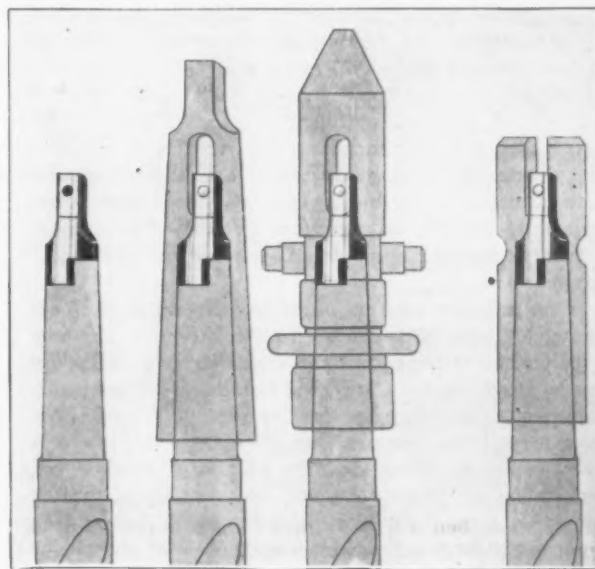
The Bordentown Steel & Tube Corporation, Bordentown, N. J., has been recently reorganized with a capital of \$250,000 and placed under new management. New equipment has been installed and the plant is now working on the production of cold-drawn seamless steel tubing for Government airplanes. It has a capacity from 10 draw benches, $\frac{3}{8}$ -in. to 2-in., of 100,000 ft. per week. H. S. White, formerly with the old Pope Tube Co., Shelby Tube Co., and Detroit Tube Co. over a period of 22 years, has been elected president. V. P. Jackson is secretary and C. P. Fuller, for eleven years connected with both the Shelby Tube Co. and Detroit Tube Co., has been made superintendent.

Special Reclaiming Tang for Drills

The Mailometer Co., Detroit, has brought out a new form of reclaiming device for tang tools. It is pointed out that the use of this new tang enables full service to be secured from a tool instead of discarding it when the tang breaks and at the same time the driving power of the shank is not increased.

When a tool tang breaks in service it is cut off with a hack saw to fit the driving shoulder of the new tang, a special gage being provided for the sawing so that the length of the reclaimed shanks will not vary. In this way the new tang is fitted on the upper part of the taper shank of the tool and the tang is exactly the same as it was originally as regards length, taper, etc., although it is composed of two parts. When the tang has been fitted to the tool it is possible to use the latter in an ordinary sleeve, collet or directly in the spindle of the machine, it being pointed out that no special sleeve is required.

The new tang has exactly the same driving power as the original tang of the drill or other tool, it is emphasized, thus doing away with any addition of



Cutting Off a Broken Tool Shank to Fit a Special Reclaiming Tang Enables Full Service to Be Obtained Instead of Making Scrapping Necessary

driving power to the shank which might cause breakage of the tools. The new tang will break before the tool will, and can be replaced at a small cost, thus insuring full service.

Fundamental Principles of Safeguarding

In a paper presented at the recent meeting of the National Safety Council held at New York, R. J. Young, manager of the safety and relief department, Illinois Steel Co., Chicago, pointed out that the obviously dangerous situations should be taken care of at the earliest possible moment, because apart from the danger of accidents resulting, such glaring unprotected hazards interfere with the educational campaign and are likely to place a damper upon the co-operation of the men. It should be a fundamental principle to comb the situation thoroughly when a man is injured on a certain machine and then advertise the way in which the accident occurred, so as to place everyone on his guard against a repetition of the accident under similar conditions.

He recommended that the safety engineer hold conferences with foremen and workmen with a view to finding out about escapes from injury, through the failure of machinery or changes that have been made in the design, with a view to preventing accidents. The remainder of the paper was given over to descriptions of the construction of guards for various locations around a plant and the protection of the workmen against the various other hazards present in large industrial establishments.

Great War Results Due to Co-operation

Achievements of the Ordnance Bureau Made
Possible by Patriotic Attitude of Manufacturers
—Inside Facts Revealed in a Notable Address

WAR preparations have now progressed to a point where it is no longer necessary to shroud every move with secrecy, and Government officials, especially those in charge of the great purchasing agencies who are brought directly into contact with the manufacturers of the country, are convinced that henceforth it will be the part of wisdom to take the public into their confidence to an extent which was neither wise nor practicable while the work of getting ready for war was in its early stages. An important consideration in this connection is the desirability of demonstrating to the public what has been done in the way of providing the vast stores of war material which are now being rushed to France and thus relieving a widespread anxiety due in great part to ill-founded criticism of the work thus far accomplished. The officials also deem it their duty to bring to public notice the splendid spirit of co-operation encountered among manufacturers in all lines, which has enabled the Government to outstrip in speed and volume of production all records previously set by the belligerent nations of Europe.

In an informal address recently delivered by Colonel Samuel McRoberts, Chief of the Procurement Division of the Ordnance Bureau of the War Department, before a gathering of manufacturers in Bridgeport, some interesting facts regarding the development of the ordnance program and the co-operation of American producers were presented, the disclosures making a marked impression on all those present. In compliance with a suggestion from *THE IRON AGE* that this information be permitted to reach a wider field, Colonel McRoberts has consented to the publication of his remarks, so far as it can be done with propriety at this time, as follows:

Jumping to Conclusions

"Much of the occasion for this secrecy regarding war preparations has passed, and we can now go to much greater length in informing the public of what is obviously public business. There is also a positive reason for doing so, as due to this secrecy and the fact that nothing was said as to what was going on, many people have jumped to the conclusion that nothing was being done, with a resultant distrust that has at times threatened to demoralize the whole Government program. On the other hand, much of the information that has been given has not been fully understood. The program is being carried out on a vast scale and the machinery for carrying it out is necessarily so complex that isolated and unrelated statements as to quantities and costs involved in this great Government program have had a tendency to confuse rather than enlighten, and have led to the natural inference that activities were not co-related and that no one actually understood the plan of the Government in its entirety; in fact, that there was no plan.

"In order to make the statement more comprehensible as to the activities and responsibilities of the Ordnance Department, let us consider it from the standpoint of the obligation put upon that department in respect to a single unit of the Army. The smallest unit bringing into play all classes of arms and all forms of munitions and equipment is an Army Division. To simplify the description at the expense of exactness, an Army Division consists of two brigades, each brigade

consisting of two infantry regiments, one machine-gun battalion, two regiments of 75-mm. field artillery, one regiment of field howitzers 155 mm., and one battery of trench mortars. These make up the primary front line forces and are supplemented by a regiment of engineers, the Signal Corps and the Aircraft Service. Back of the lines we have the transport trains for munitions and field supplies, the hospital units, heavy artillery, tanks and special reserve field artillery. For the equipment of a division the Ordnance Department carries responsibility for furnishing to the division and maintaining always on hand, in perfect order and for instant use, in round figures, 18,000 rifles, 12,000 pistols, 224 heavy machine guns, 768 automatic rifles, 36 anti-aircraft machine guns, 50 75-mm. field artillery, 24 155-mm. howitzers, 12 6-in. trench mortars, 24 3-in. trench mortars, 12 1-lb. guns, together with all necessary and reserve ammunition and also trench warfare munitions consisting of bombs, hand grenades, rockets, signal lights and other pyrotechnics. It furnishes the personal equipment of the men apart from clothing and shoes, consisting of such articles as helmets, bolos, knives, canteens, haversacks, cartridge belts, bandoliers and other miscellaneous personal equipment incident to field service. The Ordnance Department also furnishes the machine guns and drop bombs for the air-craft service.

All Kinds of Heavy Artillery

"Behind the lines the Ordnance Department is called upon to provide all forms of heavy artillery on both wheel and railroad mounts. It must also furnish the means for transporting and maintaining this material in working order, consisting of automobile trucks, tractors, motorized machine shops for field service, and extensive permanent machine shops for repairs of all classes of equipment, the repair of gun carriages and the relining of guns. From a strictly military standpoint the number of divisions to be put into the field roughly determines the program upon which the Ordnance Department must proceed.

"At the outbreak of the war the quantity of material on hand or immediately available was negligible. The experience already gained in the European war showed that practically all existing designs for this material were obsolete. To design and provide for the manufacture of the ordnance equipment and deliver it in France as rapidly as it might be required, which was the unprecedented task put up to the Ordnance Department by the American Government and the task that General Crozier and his small company of trained ordnance officers were forced to undertake, the department consisted of 79 officers and 825 enlisted men, and I will undertake to give you some idea of how they fulfilled that obligation.

"First, consider some of the difficulties. Take the subject of engineering and design. In respect to rifles there were in existence about 600,000 Springfield rifles, of a type pronounced to be efficient and practical for our needs. However, they had been manufactured only in the Government arsenals, with small manufacturing organizations, and it was impossible to increase their production so as to provide the rifles in anything like the time desired. This necessitated a compromise to meet conditions. Manufacturing facilities in this coun-

try had already been created by England for the British rifle. Unfortunately, the rifle was inferior to that in the hands of our enemies, and had to be redesigned and the manufacturing plants re-equipped for the production of an efficient rifle of a modified design.

Many Changes Necessary

"In field artillery we had worked out designs and specifications for guns that had been enthusiastically approved by the ordnance experts of this and other countries, but the conditions under which we entered the war necessitated many modifications of manufacture, due to the necessity for interchangeability of ammunition with that of our Allies and the enormous difficulties of quick manufacture. All field artillery of the 3-in. or 75-mm. type is horse drawn, which limits the possible weight of the gun and carriage. While the experience of warfare has developed the original simple field piece into a very complicated machine, the original limitation of 650 lb. per horse must still be observed. This makes the design of a field carriage one of the most difficult of engineering operations, and this was still further complicated by the fact that it was necessary to get the guns at the quickest possible rate of manufacture. It ordinarily takes years for designing and perfecting a new type of artillery. To adopt the French and English designs also presented very great difficulties from the standpoint of time. The drawings that existed in this country were out of date—many modifications had been recently made; many of the features of the French gun were secrets of the French Ordnance Office or French artillery manufacturers, and could be obtained in accurate form only by the co-operation of experts, and then after prolonged negotiations. For the utilization of existing seacoast and naval guns, special carriages for both wheel and railroad mounts for heavy artillery had to be designed *de novo*.

The High Explosive Shell

"The high explosive shell is practically a product of this war, and had to be designed not only with a full knowledge of the experience gained by our Allies, but with a view to their early production out of materials that could be obtained in this country. The design of tractors, tanks, and motor repair equipment had to be without precedent or experience.

"Never in the history of warfare has chemistry been called upon to play such a large and important part. Not only was it necessary to design propellants from well-known materials, but new combinations had to be arrived at in order to fit our needs for the possible production of the various chemical ingredients. An entirely new element has been introduced by gas warfare. The first use of gas released before a favoring wind has been supplemented by the surer and more scientific way of placing by means of gas-loaded shells, and the proportion of shells loaded with gas is steadily increasing.

"Contracts have been let for the production of two and one-half million rifles, of which there have been delivered to date 800,000, and the production has reached 11,000 per day. On rifles we are ahead of our needs, and provision is now being made for closing down one of the rifle factories, so as to obtain its facilities for increasing the output of machine guns.

"We have contracted for about one million automatic pistols and revolvers. All the pistol facilities, outside of the Colt organization, had to be created. We have received only 160,000 to date, but from now on the production will rapidly overtake the needs. Of small-arms ammunition we have contracted for practically three and a half billion rounds, and our production has already reached greater proportions than was ever produced by either France or Great Britain. One manufacturer delivered in the past month a quantity of rifle ammunition aggregating more than 125,000,000 rounds.

"We have let contracts for 270,000 machine guns of various types and have delivered to the troops 45,000. A large part of the plant capacity had to be created, and heavy deliveries of these guns will not begin until April.

"For motives of policy it is not permissible to discuss the details of our artillery program. It was obviously impossible to furnish this artillery short of a year, and as surplus manufacturing capacity existed in France and England, by furnishing them the raw materials we are meeting our artillery equipment for the first year from that source. Practically all of our artillery program, as planned at present, is under contract, and al-

ready we have reached a production equal to 50 per cent of that of France. Two hundred and ten million dollars was expended on this account up to the first of February. In the artillery program is included motorized vehicles amounting to something over 40,000 pieces. The artillery projectiles contracted to date amount to a total cost of over \$1,000,000,000 for over 60,000,000 shells of all descriptions. Over 400,000,000 lb. of explosives are in process of manufacture, and two smokeless powder plants of a capacity of 1,125,000 lb. per day are under construction and a third under consideration. Some comparative idea can be gained as to the volume from this incident: At the outbreak of the European war I was asked by one of the European governments to obtain 1,000,000 lb. of smokeless powder in the United States. When presented to the leading powder manufacturers, they called attention to the unprecedented size of the order, and said it could be furnished only by an extension of their plants, and deliveries would not begin until four or five months after the order was placed. To-day we are planning to furnish our own Army four or five times this amount per day.

Some Interesting Figures

"I do not want to confuse by going into too much detail, but the following figures are significant: We have purchased \$23,000,000 worth of leather. We have

Seeing the Way Through the Great War

THE intensely interesting address by Colonel McRoberts, publication of which is made possible by the somewhat more liberal policy of the Government in regard to disclosing facts relating to the war, shows the highly gratifying progress that has been made in manufacturing munitions and other supplies with the hearty co-operation of business men.

Particularly significant is the statement that the "entire situation has progressed to a point where we can see our way through for every known need of the war. The only element of concern is that of time."

"Colonel McRoberts declares that the superabundance of basic materials for the needs of the United States and also of its Allies is now evident more than ever.

spent over \$50,000,000 in trench warfare material alone. The demand for pyrotechnics is such as to require the building of a vast fireworks plant after filling up every known manufacturer with all that he would take. Drop bombs for aeroplanes is an item that runs over \$300,000,000. In order to get chemical raw materials we have been forced to build many extensive plants, calling for a huge outlay. To provide ammonia and nitrates, in addition to the foreign supply, two plants, costing approximately \$30,000,000 each, are under construction, and still others are being planned. Our only source for nitrate is either the Chilean field or that taken from the air by electrical process. Germany is dependent entirely upon her own resources for nitrate, and has 67 huge plants for obtaining nitrate by this same process.

"These figures will give some idea of the huge and absolutely unprecedented task that was put up at the beginning of the war to General Crozier and his little command. Many of you are manufacturers, and it is not necessary for me to go into detail to call attention to the infinite number of difficulties that have been encountered. A large part of the misunderstanding of the effort of the Ordnance Department comes from a lack of knowledge on the part of the general public of the mechanics involved. The country has hardly yet gotten away from the enthusiastic though somewhat impractical idea that in case of war 1,000,000 men could spring to arms overnight. The general public does not understand what it means to create manufacturing facilities for this material, which is nearly all of a highly technical character, involving the fabrication of steel and iron and chemicals. They do not know what it means to equip a new factory with machine tools, dies, jigs and fixtures and to bring together an organization of skilled workmen, many of whom have to be turned from green hands, to get quantity production. Neither does the general public appreciate the thousand and one vexatious disappointments that are incident to such a manufacture when time is the essential element in the operation. Add to this the handicap interposed by the severest winter in the history of the country, a breakdown on the part of our transportation facilities and our fuel supply, multiply all this by the variations in the human equation, the mistakes made in and out of the Army by the unexpected changes of program owing to the developing experience at the front or the discovery of new materials or new invention, it is no wonder that no one in the Ordnance Department has had time to keep the public informed and sympathetic with its efforts.

Never Was a Fall-Down

"There never was a fall-down in the Ordnance Department, and I confidently predict there never will be. As the organization now stands it has at its head General Crozier, the Chief of Ordnance, the man that has given the largest single contribution to this war on its material side, and who, when the technical history of the war comes to be written will be placed in one of the highest positions ever attained by an American soldier. The facts will constitute a complete answer to his critics.

"In the absence of General Crozier, the Acting Chief of Ordnance is Brigadier-General Wheeler, a man who has participated in every campaign conducted in this generation by American arms, and who has manufactured in the arsenals and elsewhere all the materials provided by the Ordnance Department, with the exception of powder. He is a soldier and a manufacturer, a clear-headed business man and a competent leader for any business or military undertaking. He is surrounded by an immediate staff of highly trained and experienced Army officers, and in this immediate staff the plans of the Ordnance Department are made

up, based upon their own knowledge of field conditions, information from the expeditionary forces in France, the General Staff and the office of the Secretary of War. When these plans are perfected orders for the material are directed to the Procurement Department, where the contractors are selected and the contracts negotiated or contracts entered into for the erection of new plants or the supplying of material not otherwise obtainable. When these contracts are executed they are directed to the Production Division, which has at its head Colonel Tripp, formerly chairman of the board of the Westinghouse Electric & Mfg. Co., an engineer of long experience in construction and manufacture. It is the business of the Production Division to follow up these contracts with the manufacturers, and to assist in every way possible in securing an output up to the expectations expressed in the contract. The Inspection Division, under Colonel Dunn, a Regular Army officer, who retired from the Army and has had long civilian and business experience, through his inspectors stationed in every plant in the country engaged in war work, sees to it that the material is turned out, is in accordance with specifications and up to the needs of actual warfare. The Inspection Division and the Procurement Division, together with the Finance Department, have established branch offices in 10 or 12 of the principal centers of the country, where, through local advisory boards, they are in close touch with the situation as to transportation, raw materials and labor, and are in the best possible position to meet any unexpected conditions that may affect the steady flow of manufacture. The two organizations have a personnel of some 6000 men, which will be further increased as the business gets more fully under way. Those who are familiar with the organization feel that it is complete and efficient to meet the task, and that the only improvement possible is by adding stronger and more experienced men whenever opportunity is afforded.

Place for Business Men

"There has been considerable discussion, not always intelligent, as to the best form of organization for war preparation. There has been strong sentiment that it should be a civilian organization headed by a business man. From my own study of the matter I am convinced that no business man is qualified to take this responsibility. The plan of what should be purchased and the selection of the type of material and its design are so intimately dependent upon a knowledge of military affairs and the conditions of camp life and actual warfare, that no civilian can bring to these basic operations the necessary experience. The correct place for civilian help is that of assisting the Army experts only as to the business aspects of the program, those of purchasing and manufacturing, and must necessarily be subordinated to the military experience.

"Probably the most important element in this whole situation, and one that I can refer to with the greatest pleasure and satisfaction, is the attitude of the manufacturers and all business men generally, in respect to the creation of munitions. In the early stages of the European war, London and Paris were crowded with men of every type and class, seeking war contracts. Business adventurers of every description, as well as those representing substantial financial and business interests, were pressing their suggestions by every possible means, upon the Allied governments. While we hear an occasional reference in the halls of Congress or elsewhere to alleged attempts at profiteering, as a matter of fact there is no evidence of it around the War Department. You will find Washington hotels filled with business men, but when you interrogate them you find that they have been requested to come to Washington rather than that they are there seeking business. It is a splendid tribute to the busi-

ness men of this country that they have offered their services and the services of their organizations freely to the Government, and there has been no difficulty in obtaining their co-operation. In fact, nothing like what has been done could have been accomplished had it not been for this strikingly patriotic co-operation on the part of the business of the country. I could cite innumerable instances where Government work has been undertaken at very great and permanent sacrifice on the part of the manufacturers and it has been done cheerfully and without hesitation.

"In this connection I might describe briefly a single instance showing the enterprise as well as the patriotic spirit that has animated our manufacturers.

Noteworthy Achievement

"Before the European war all countries, with the exception of France, had their artillery equipped with spring recoil mechanism. France had developed a hydro-pneumatic recoil mechanism which eliminated the use of springs. The life of springs was very short, and after a gun had been fired a few times they did not return it accurately to firing position. The hydro-pneumatic system of the French, however, had a life longer than the gun, and returned the gun to firing position accurately every time it was fired. The French hydro-pneumatic recoil mechanisms have been kept secret for years. Other countries have tried to develop similar systems, but without success.

"When we entered war arrangements were made with the French Government to give us the secret of their hydro-pneumatic recoil mechanism. There was not a manufacturing plant in this country equipped to build one of these mechanisms. It consists principally of a forging about 7 ft. long for the larger guns, having parallel two holes bored completely through them. These holes, or cylinders, which are 7 ft. in length, must be parallel to 0.002 in. in 7 ft., and they have pistons fitted into them which have air on one side of them at approximately 600 lb. pressure, and liquid on the other side, and the pistons must fit so accurately that there is no leakage. These pistons hold a pressure in the cylinder for two or three years. There has never been any machinery built in this country of this size with the degree of accuracy required for these recuperators.

"The matter was put up to manufacturers of the country, and it was impossible to find any one who wished to take hold of the proposition of producing these recoil mechanisms in the quantities required. Finally the situation was laid before the Dodge Brothers, automobile manufacturers, and they were told that the production of heavy artillery was absolutely dependent on getting someone to build these recuperators. They told a representative of the Ordnance Department that if no one else could be found to undertake this they would do so. Accordingly, they were requested to proceed with the work on Nov. 1.

Profit Not Considered

"In taking this contract the question of the amount of profit was not considered by the Dodge Brothers. They left that entirely to the Government. They turned over their automobile business, which now employs 12,000 men, to some of their lieutenants, and both these men have devoted their time exclusively to the building of the plant for the manufacture of recoil mechanisms. For this work they undertook to put up a one-story brick and steel building covering 13 acres and to equip it with a large number of machine tools. By Dec. 1 a concrete slab floor 11 in. thick and covering 13 acres was laid, after the site had been graded and drained. On Dec. 5 the first steel work was erected and on Jan. 4 the steel work for the first bay of the building, 900 ft. long by 180 ft. wide, was completed and \$6,000,000

worth of machine tools had been purchased or their manufacture undertaken in the present plant of the Dodge Brothers. On Jan. 15 the first bay was completely closed in and machine tools were being installed. On March 1, 120 days after the signing of the contract, the steel work for the entire building was erected, two-thirds of the building closed in, \$3,000,000 worth of machine tools installed and the work of turning out recoil mechanisms begun. It is expected that by April 1 the entire plant will be completed.

"From the very beginning an important feature of the work of the Government has been the careful study of the raw material resources of the country, and we have now progressed to a point where the maximum possible requirements of the war can be quite definitely calculated. While great efforts still are necessary to provide facilities for converting these raw materials into usable form, the superabundance of the basic materials is now more than ever evident both for our needs and the needs of our Allies. In other words, the entire situation has progressed to a point where we can see our way through for every known need of the war. The only element of concern is that of time. All we want is time. The Ordnance Department and the other organizations of our Government for war will definitely and surely furnish all that is needed.

A Few Personal Words

"Before concluding I would like to say one word for the personnel of the Ordnance Department. It is made up of trained Army officers, supplemented by men recruited from civil life who are supplying their technical skill as manufacturers and their training as business men to secure a prompt and steady flow of munitions to the front. It has lately been the fashion to gibe at these men and they have been caricatured as 'bombproof soldiers' and 'swivel-chair officers.' I have sometimes wondered, in view of the public sentiment that has thus been created, why they have not all asked to be relieved to go home, but the answer is in the spirit in which they are doing this work. There is not one of these regular army soldiers that would not give everything he holds dear on earth for an opportunity to enter the line service, and it is only his loyalty and a keen sense of duty that prevents him from making the effort. As to those men recruited from civil life, it should be said that none of them has any illusions as to his military status. All know and appreciate more clearly than anyone else that the only real warriors are those who are making the supreme offering, not only of personal comfort, incomes, advantage and power, but of life itself.

"The personnel of the Ordnance Department might be compared to the armorer of mediaeval days. His place was in the castle, but it was his skill that forged the sword and riveted the armor, and these men in Washington are going about their daily tasks with a prayer in their hearts that the sword when tested may not fail and that the armor may not prove weak. For them I ask the respect and co-operation of the business men of the country."

W. L. C.

Japan's Exports of Metals to the United States

Japan's export trade in metals to the United States is increasing. From Jan. 1 to Nov. 12, 1917, or 10½ months, 45 tons of ferromanganese and 1918 tons of manganese ore were shipped to this country. Of copper ingots and slabs 1,097,600 lb. were sent besides 1,635,864 lb. of refined antimony. Shipments of tungsten ores to this country in the same period were 194 tons, besides one ton of ferrotungsten. Of molybdenum material the total was 490 tons of various molybdenum ores and 14,699 lbs. of molybdenite. Of zinc dust, this country received from Japan in the same 10½ months last year 730,675 lb.

PURE SHEET NICKEL*

Offered for Cooking Utensils and Chemical Field
in Solid and Not as Plated

PURE solid nickel should not be confounded with the much inferior metals usually sold as nickel, which consist mostly of steel, brass or German silver with a thin plating of nickel. This plating wears off in a short time, leaving manufactured articles unserviceable and worthless.

Nickel is essentially an American product. For many years past it has been a general practice to use ore which has been mined in this country and Canada, having it fabricated into its various forms by European manufacturers. Previous to the war most of the material imported into this country as foreign stock was the American metal worked into the form of sheet, strip and finished articles of manufacture by foreign concerns. Up until a few years ago there had never been any appreciation of the many points of vantage of this metal for almost innumerable purposes, and consequently there had never been any adequate facilities for rolling it into large sheets.

Pure nickel does not rust or oxidize, and consequently every danger of poisoning generally caused by verdigris is eliminated. Neither will the metal tarnish like silver or some of the alloys, such as German silver, and, even though the surface be injured, there is no danger of corrosion resulting as in a plated article. Furthermore, the tedious and expensive plating operations required for articles made of other metals is entirely abolished. This makes the metal particularly adaptable for use in the manufacture of cooking utensils or food handling equipment where the highest precautions must always be observed to avoid infection and poisoning. This advantage of perfect safety lasts as long as the article itself, whereas plated utensils must be discarded or replated upon the appearance of the slightest break in the nickel protecting surface.

While not so good a heat conductor as aluminum, nickel utensils are made of a thinner material, which more than overcomes the difference. Pure nickel has a melting point of about 2600 deg. Fahr., whereas aluminum has one of about 1200 deg. There is not the same possibility of this metal being softened under

constant use. The metal is also much more resistant to the action of the acids commonly found in food products. The fine silverlike appearance of pure nickel does not change in use, and the cleaning of these utensils is as easy and simple as possible, hot water or soda being quite sufficient.

In the chemical field there are many uses for this metal. The surface of pure nickel is not attacked by acids or alkalis in the dilute form usually encountered in ordinary service. In fact, it is practically immune to the attacks of all alkalis, regardless of their strength, and is largely resistant to the action of most acids.

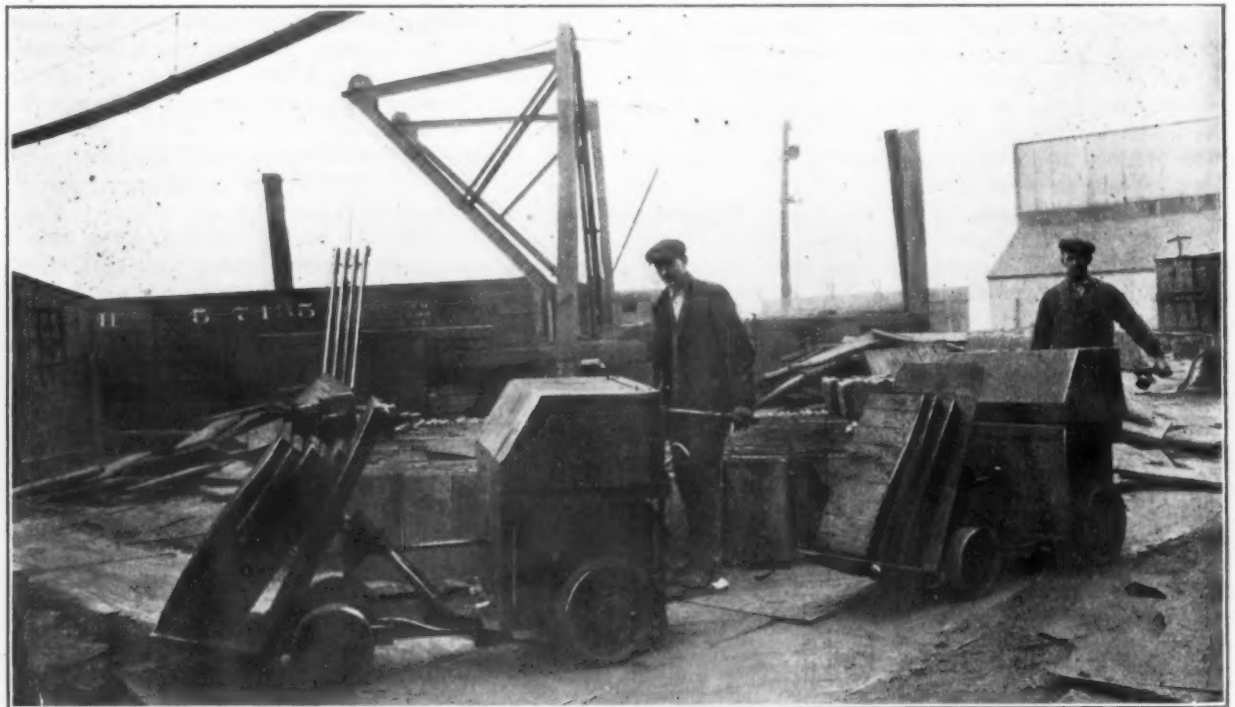
Nickel has a high tensile strength and in the sheet form, being homogeneous throughout, is ductile and easily formed by spinning or stamping. No special equipment is necessary for manufacturing articles from these sheets, the same tools and metals being employed as with German silver and hard alloys.

The great increase in the cost of copper and its products has brought pure nickel to a point where it can be compared with favorably as to initial cost, without counting long life and service.

Industrial Truck for Handling Slabs

New uses for storage battery trucks are frequently being found in industrial plants, and are proving an important factor in cutting down labor costs. One of these involving the building of a special type of truck to meet peculiar requirements has been made recently at the plant of the Cleveland Steel Co., Cleveland, where specially designed storage battery trucks are being used to haul slabs from the storage yard to the heating furnaces. The conveying of the slabs requires a long haul, amounting to approximately 500 ft. from the back of the storage yard. Before electricity was substituted for man power for handling the slabs the latter were loaded on hand trucks, and the hauling of these trucks with their heavy loads over the rough yard and mill floor was hard work.

The slab handling trucks that are used are similar in general design to the elevating platform trucks of the Elwell-Parker Electric Co., Cleveland, which built these trucks, but in place of the horizontal platform and its elevating mechanism a tilting platform is provided. This platform is pivoted to the rear axle and is operated by a horizontal ram, as shown in the illustration. By manipulating the ram the platform moves toward a vertical position, lowering the front edge of the plat-



A Storage Battery Industrial Truck with a Tilting Platform Handles Enough Steel Slabs in 2 Hr. to Supply the Mill for 6 Hr. and Has Effected a Saving of 2 or 3 Men Using Hand Trucks

*From a monograph prepared by Stanley M. Tracy, assistant general sales manager of the Driver-Harris Co., Harrison, N. J., which has provided facilities and equipment for manufacturing sheet nickel in a large way.

form until it comes in contact with the floor. The platform is then in a slightly sloping position and the slab is walked upon the edge of the platform and stood against the upright section. After loading the ram tilts the table backward somewhat toward a horizontal

A Special Coal Handling Gantry Crane

A rather unique system of dynamic braking is employed on two high-speed alternating-current coal handling gantry cranes, which were built by the Gen-



A Unique System of Dynamic Braking Employing a Combination of an Alternating-Current Driving Motor Directly Coupled to a Small Direct-Current Unit Is Used on a Special Gantry Crane Handling Coal at a Steel Plant

position, at the same time raising the lower edge or toe of the platform. In this position the platform rests on heavy coil springs which cushion the load, and the center of gravity is thrown more nearly over the supporting axle. The ram is operated by a separate motor from the one that drives the truck.

The truck has extra large steel wheels and the driving wheels are rubber tired. It has a single reduction worm drive, full floating axle and an interlocking circuit breaker and controller. Its capacity is 4,000 lb.

A load of from 2 to 3 tons of slabs is hauled on the truck, two of which are used in the plant, and the company is able to haul in 2 hr. enough slabs to supply the mill for 6 hr. The use of these trucks has resulted in saving the work of two or three men in handling the slabs, as compared with the old way.

M. A. Hanna & Co.'s Ore Book

Two new ores are listed in M. A. Hanna & Co.'s Lake Superior Iron Ore Analyses Book for 1918. One is the Butler, a Mesaba non-Bessemer ore with an expected iron content of 51.19 per cent in its natural condition, and 59.52 per cent dried at 212 deg. This is from one of the former Great Northern ore properties from which the Smith ore, a Bessemer grade, was sold last year. The other new ore is the manganiferous Sultana from the Cuyana range, having a guaranteed iron content of 34 per cent in its natural condition and running 38.23 per cent in iron when dried. This ore carried a guarantee of 13 per cent in manganese when dried. As in past years, a table is given for figuring premiums and penalties based on general prices of Lake Superior iron ores for 1918.

The average load carried by each freight car on the Pennsylvania Railroad's Eastern lines in December, 1917, was 37.23 tons as compared with 31.70 tons in the corresponding month of the previous year, or an increase of 5½ tons per car. In 1915 the average load carried per car was less than 29 tons. As there are 164,000 freight cars on the Pennsylvania Railroad Lines East of Pittsburgh and Erie, this increase in the average loading has been equivalent to the addition of 49,000 cars to the equipment available for the service of the public.

eral Electric Co., Schenectady, N. Y. In these cranes, which are installed at the La Belle Iron Works, Steubenville, Ohio, a small direct-current motor is coupled directly to the alternating-current driving motor to provide the dynamic braking. This installation is claimed to be the first application on any large scale of this system of dynamic braking to cranes and eliminates the motor-generator set that is employed to secure the dynamic braking action for alternating-current hoist motors.

The cranes will hoist a 4-ton bucket of coal at a speed of 500 ft. per min. and in lowering the load a creeping speed of 110 ft. per min. can be obtained under ordinary service conditions. The hoisting is accomplished by a 375-hp. slip ring induction motor which is directly coupled to a 40-hp. direct-current motor. The two motors are combined in such a way that the direct-current unit serves as an exciter and gives dynamic braking which is comparable with that ordinarily obtained with direct-current motors on this class of work.

In addition the General Electric Co. furnished motors for six of the largest cranes installed in shipyards and industrial plants in 1917. Three of these were designed for a full load lift of 330 tons at a speed of 12.6 ft. per min. of the main hoist hook. The equipment of each crane included two 200-hp. motors for the main hoist, two 105-hp. units for the auxiliary hoist, two 50-hp. motors for the bridge motion, and one 80-hp. and one 30-hp. motor for the main and auxiliary trolley. The fourth crane had a lifting capacity of 225 tons with a total motor rating of 850 hp. The load in this case was hoisted at 40 ft. per min. while a 60-ton load could be handled at the rate of 120 ft. per min. In this instance the customary arrangement of rheostats and contactors was not employed and the Ward-Leonard system of control was provided, this being the first application of it, it is stated, on large cranes. In addition equipment for two 225-ton cranes each having a total rating of 420-hp. was provided.

Civilian workers are wanted by the Ordnance Department and special training will be given if necessary. A high school education and some shop training is desirable. The jobs include inspectors of steel, munitions, etc. Apply to C. V. Meserole, 79 Wall Street, New York.

WOULD PREVENT STRIKES

House Is Afraid, However, to Stand by Action as Voted

WASHINGTON, March 12—The House of Representatives, during the past week, in a remarkable legislative performance, voted to make it a crime for workmen to conspire to prevent the production of war materials, thus prohibiting strikes in munition plants and, ten minutes later, executed an astonishing right-about-face by adopting an amendment to the effect that nothing in the pending measure should be construed as making it unlawful for employees "to agree together to stop work or not to enter thereon with a bona fide purpose of securing better wages or conditions of employment." The most amazing feature of this incident is the fact that, although the purpose of the original proposition to prevent strikes was fully understood, it was adopted by a vote of 255 to 59, while the amendment making it an absolute dead letter was agreed to without a word of explanation or debate by a vote of 272 to 38. It would appear to be a reasonable conclusion from this extraordinary performance that the House is unwilling to place any limitations upon the right of workers to strike even though they may be engaged in the vital work of making war material and the incident is not without a bearing upon the possibilities of securing legislation conscripting labor in the event that the Administration should deem such a course necessary.

Representative Cannon, of Illinois, the veteran ex-speaker of the House, proposed an amendment to make the bill more definite. "What is the use of shying?" he demanded. "I ask it in all good faith. This is a war measure and not a peace measure. If the Industrial Workers of the World or any other set of people—if the farmers, if the producers, or anybody that produces anything that is necessary to carry on this war—conspires, in the language of this bill and of this substitute, then they are guilty of a crime.

"You may say that it is crude, that it has no place here. Well, for everything a place, for all times a season. The fact that the war is on, and especially this war, makes this amendment apt. Does any member who listens to me want to say that we have sent these soldiers abroad and yet that men can conspire to keep them from getting food, to prevent the construction of ships to carry the food, or of convoys to transport them when they cross, and all along the line—that the coal that is necessary, the iron that is necessary, the munitions that are necessary shall not go? If so, I am not in harmony with him, and I am here to say if anybody wants to criticize me for holding these opinions, by political threat or otherwise, and no one on the floor of the House desires to make a political threat, I would rather take the criticism and die than not to attempt to put the law on the statute books."

Chairman Webb of the Judiciary Committee urged that Mr. Cannon's amendment was incomplete, and Mr. Cannon agreed to a modification to meet Mr. Webb's views. The House thereupon, by a vote of 255 to 59, adopted the section as amended in the following form:

Sec. 2. That when the United States is at war, whoever, with intent to injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, or whoever, with reason to believe that his act may injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, shall willfully injure or destroy, or shall attempt to so injure or destroy any war material, war premises, or war utilities as herein defined, or whoever with intent to injure, interfere with, or obstruct the United States or any associate nation in preparing for or carrying on the war, shall conspire to prevent the erection or production of such war premises, war material, or war utilities, shall, upon conviction thereof, be fined not more than \$10,000 or imprisonment not more than 30 years, or both.

Immediately upon the adoption of the amended section pro-labor Members on the floor held a hasty conference and Representative Lunn, of New York, offered

the following additional amendment, which was adopted:

Nothing herein shall be construed as making it unlawful for employees to agree together to stop work or not to enter thereon with a bona fide purpose of securing better wages or conditions of employment.

New Jersey Manufacturers Plan for War Work

The recently organized Manufacturers' Council of New Jersey has undertaken a state-wide campaign to enroll as members representatives of every one of the more than 3000 manufacturing plants in the State. Preliminary arrangements have been completed for the establishment of its bureau at Washington for placing manufacturers of the State in direct contact with the Government bureaus and officials who have the placing of war contracts.

The object will be primarily to assist the Government in learning where needed supplies for the army, navy and other departments may be secured most readily and what concerns in New Jersey are capable of meeting the Government's needs. At the same time the bureau is designed to enable the manufacturers of the State to place their facilities directly at the disposal of the Government and to secure a proportion of the contracts.

Plans are already under way for the starting of similar organizations in other States. This is to be done without any attempt to infringe upon the important work being accomplished by the National Association of Manufacturers and other national bodies, but has for its object the forming into compact organizations the manufacturers in the various states.

All trades and industries of the State have been classified, and groups of representatives of these trades have been formed to consider matters of special importance in each line of industry. These divisions, with subdivisions, are:

Metal Division: Chairman, Arthur E. Barlow, Barlow Foundry, Inc., Newark; boiler-tank group, chairman, David Leslie, Leslie & Elliott Co., Paterson; brass foundry group, chairman, George Krouse, Jersey City; cutlery group, chairman, M. G. Hammerschlag, Compton Shear Co., Newark; furnaces, ranges and heaters group, chairman, William M. Crane, William M. Crane Co., Jersey City; galvanizing works group, chairman, James U. Elliott, Elliott Galvanizing Co., Jersey City; metal goods group, chairman, G. H. Neidlinger, Peerless Tube Co., Bloomfield; structural steel group, chairman, L. P. Smith, Irvington Mfg. Co., Irvington; graphite products group, chairman, J. H. Schermerhorn, Joseph Dixon Crucible Co., Jersey City.

Machinery Division: Chairman, J. B. Monroe, Monroe Calculating Machine Co., Orange; machinery group, chairman, E. F. Britten, Jr., V. P. Monroe Calculating Co., Orange; artisan tools group, chairman, M. A. Coe, superintendent, Atha division, Stanley Rule & Level Co., Newark; welding and cutting group; chairman, Arthur P. Davis, Oxweld Acetylene Co., Newark; electrical appliances group, chairman, Dr. Edward Weston, Weston Electrical Equipment Co., Newark.

Automatic Squirrel Cage Motor Starting Switch

For controlling the starting and stopping of single and polyphase motors from a remote point, the Cutler-Hammer Mfg. Co., Milwaukee, has brought out an automatic switch of the double pole clapper type. It is operated by push buttons and two inverse time element overload relays are mounted on the same panel with the switch. These relays are furnished with the self-resetting feature but can also be arranged for manual resetting, which requires the operator to go to the starting panel after an overload has occurred before the motor can be started again. The wiring of the switch is such that the motor control circuit is broken if either of the overload relays operate, the stop push button is pressed or the main contactor opens due to low voltage or any other cause.

Separator for Compressed Air Lines

To remove moisture from compressed air the Griscom-Russell Co., 90 West Street, New York, has developed a separator. It is operated in a way similar to a steam separator and is intended particularly for use in connection with sand blast machines and pneumatic tools.

The separator is made of close grained cast iron and is designed for a maximum working pressure of 160 lb. per sq. in. The separation of the water from the air is accomplished by centrifugal force. The air and the water after entering the separator pass through a helical path formed around a central core that imparts a whirling motion. The water is several hundred times heavier than air, and as it cannot make the turns so easily, it is thrown out of the path of the air against the outer wall. It adheres there and trickles down slowly to a receptacle at the bottom, while the air makes the turn easily and passes on freed from the moisture produced by the compressor.



Moisture Is Removed from Compressed Air by Centrifugal Force in the Same Way That Steam and Water Are Separated

Government Price on Aluminum

WASHINGTON, March 12.—After investigation by the Federal Trade Commission as to the cost of production, the President has approved an agreement made by the War Industries Board with the producers of aluminum, fixing a maximum base price of 32c. per lb. at the various American plants and their subsidiaries, subject to revision on June 1, 1918, such price to cover lots of 50 tons and over of ingot of a grade 98 to 99 per cent. The differentials now in force for the sundry grades, quantities and shapes, will continue in force for new contracts. Deliveries on "indirect Government orders" to parties who now have contracts with the company producing aluminum at a base price in excess of 32c. per lb. will be under such contracts, but the purchasing Government, on satisfactory proof that such amount has been delivered, will get the benefit of a rebate amounting to the difference between the price such parties would be entitled to at a 32c. base price and the contract price for the net weight of aluminum delivered to the Government, plus the weight of the necessary and proper amount of scrap. Deliveries which have been made on direct or indirect orders, subject to adjustments shall be adjusted to the 32c. basis.

Determining the Cost of Slipping Belts

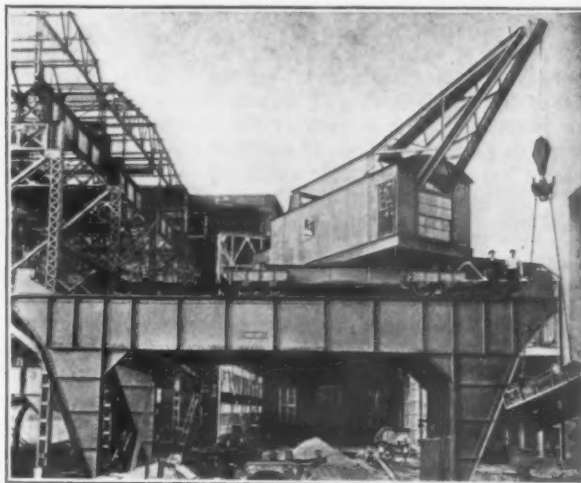
To enable owners of industrial plants to ascertain easily and quickly just what slippage of belts costs in a year, the Cling-Surface Co., Buffalo, has prepared a chart. It consists of five vertical lines, the outside pairs being graduated into various units for measuring the percentage of belt slip, the cost of coal per ton, the cost of avoidable slip per year and the amount of coal burned. In compiling the chart, which undoubtedly can be secured from the company upon application, the loss due to the natural elasticity of the belt has been taken into account.

Plans for improvements at the plant of the Harrisburg Foundry & Machine Co., Harrisburg, Pa., will be discussed at a meeting of the stockholders, which will be held March 28 at the general offices in that city.

Locomotive Gantry Crane for Shipyard

Locomotive cranes of the gantry type will be very largely used by the United States Government in France on the large unloading docks, and are finding their way into shipyards that are building the American fleet of merchant vessels. A new type of locomotive gantry crane was recently built for the New York Shipbuilding Corporation, Camden N. J., by the Brown Hoisting Machinery Co., Cleveland.

This crane has a capacity of 30 tons, and is used for unloading and handling around the yard material received for shipbuilding work. It has a fixed boom 30 ft. long and travels on the top of the gantry on tracks spaced 22½ ft. on centers. The span of the gantry is 40 ft., being sufficient to reach over three railroad



A New Locomotive Gantry Crane with a Capacity of 30 Tons Handling Material in an Atlantic Coast Shipyard

tracks, and it has a clearance of 20 ft. above the tops of the rails. The crane is electrically operated throughout, and is entirely controlled by the operator in the cab.

Bonus System for Motor Truck Drivers

A bonus system for the drivers and helpers of motor trucks is suggested as a very practical way of increasing the efficient use of these vehicles by George W. Veale, Timken-Detroit Axle Co., in a paper read before a truck owners' conference at Detroit. This plan does not differ in any marked degree from that employed for machine shops, the only difficulty being to secure a satisfactory unit for gaging standard performance. The one recommended is the ton-mile, which is the same as that used by the railroad for freight service. Before establishing any standard unit, however, records covering a suitable period of time should be taken to give average conditions. In the system outlined by Mr. Veale after maximum and standard costs per ton-mile had been determined the drivers and helpers are offered a bonus of 50 per cent of the saving made. At one plant where this system has been in operation for a period of 15 months, the percentage of gain in the total number of ton-miles has varied all the way from a loss of 10 per cent to a gain of 104 per cent, while the cost per ton-mile has decreased from 24.8 to 64.7 per cent.

Steel Tubing to Be Made in Australia

Steel tubing will soon be manufactured in Australia by the Lloyd-Wells process. According to the *London Iron & Coal Trades Review*, the British Trade Commissioner is informed that a company is about to be registered with a capital of £60,000 to establish the necessary works. The capacity of the plant is to be 1,000,000 ft. of tubing per annum. The American company controlling the patent for these machines in the United States has laid down its own plant for the rolling of steel strip and has offered to supply the Australian company with 500 tons of strip monthly.

Heavy Charge on Industry Proposed

Director General of Railroads Prepares New Schedule of Rates for Delivery of Cars and Spotting—Many Protests Received at Washington

WASHINGTON March 12.—The big governmental machine for handling the railroads of the country during the war is rapidly nearing completion. The final agreement in Congress on the Administration's railroad bill made during the past week has been promptly followed by developments of great importance to manufacturers and shippers, including the launching of a project for raising several hundred million dollars, to be contributed in large part by the iron and steel industry, through the imposition by trunk lines of spotting charges at industrial terminals; the detailed organization of the new Division of Finance and Purchases, and the institution of a survey of the rolling stock of the railroads for the purpose of locating all locomotives not now in actual service but which, if repaired, could be used in meeting the extraordinary demands now being made upon the transportation facilities of the country.

Terms of the Compromise

The railroad measure, as finally agreed to by the conference committee, is regarded as fairly satisfactory alike to the carriers, to the owners of their securities, the shippers, and the general public. Under the terms of the bill the roads will continue under governmental control until 21 months after the formal declaration of peace. Their revenues will be guaranteed by the Government on a basis to be fixed by the President not exceeding the average earnings for the three years prior to July 1, 1917. The President may exclude from governmental control such roads as are not needed in the national system and may remit to the Court of Claims roads dissatisfied with the rate of compensation offered by the Government. All the so-called shortline railroads, which either connect or compete with the roads already taken over, are brought under governmental control through the adoption by the conferees of the House provision to this effect. State taxation of railroad property while under governmental control is limited to the amounts paid during the year 1917.

Fixing of Freight Rates

The most important feature of the railroad measure from the shippers' standpoint, namely, the provision regarding fixing of freight rates, is a compromise between the Senate and House drafts of the railroad bill. The Senate left the rate-making power in the hands of the Interstate Commerce Commission, while the House transferred it to the President and thus indirectly to the Director General of Railroads. In the resultant compromise, the President is authorized to make rates which become immediately effective and which cannot be suspended as may now be done either on complaint or upon the initiative of the commission. The commission is empowered, however, either upon complaint or on its own initiative, to begin a proceeding to determine the reasonableness of any rate fixed by the President and may modify such rate after full investigation and hearing, the modified rate to remain in effect for two years in accordance with the present practice. In considering complaints regarding rates the commission is admonished to take into account the fact that the roads are being operated as a unit and not in competition, also the existing conditions and any certification that may be made by the President that more revenue is required to pay the running expenses of the carriers.

Proposed New Tariff

That the Director General of Railroads will give his earliest attention to the building up of the revenues of the leading systems is clearly apparent from action just taken. Even before the conferees had reached an agreement on the railroad bill, the Director General

caused to be prepared a new tariff involving heavy charges for the delivery and spotting of loaded cars at the "gates" of industrial plants. This tariff, which proposes a delivery charge of \$2 and a spotting of \$1 additional per car has been forwarded by Mr. McAdoo's instructions to all State railroad commissions through the special war committee of the National Association of Railway and Utilities Commissioners in the following form:

First, railroad rates and charges subject to published rules and practices to apply on freight traffic between public stations of the carriers parties to the tariff.

Note: Public stations are defined as railroad warehouses or team tracks which are open for the use of all shippers alike for the receipt and delivery of freight traffic.

Second, railroad rates and charges subject to published rules and practices to apply to and from the "gate," on traffic destined to or originating on private sidings or industrial tracks.

Note 1: Private sidings or industrial tracks are defined as tracks for the receipt and delivery of freight traffic, owned by or located on property of an industry or devoted to the private use of an industry and not open to the public.

Note 2: The "gate" of a private siding or industrial track is the point where such track connects with the right-of-way line of the carrier or an established interchange point between the carrier and the industrial track.

Third, to cover the terminal and switching service necessary for the receipt and delivery of traffic at private sidings or industrial tracks a charge be made as follows:

(a) For placing a loaded car with inbound freight at the "gate" of a private siding or industrial track or taking a loaded car therefrom, \$2 per car, no charge to be made for empty cars except such as may be ordered for loading and not used.

(b) For service on the private track or industrial siding beyond the "gate" in the placing of a car loaded or empty at a particular point on such tracks for unloading or loading, \$1 per car.

(c) For intra-plant switching, i.e., movement from one part of the plant to another for the sole purpose of the plant, \$2 per car.

(d) Proper rules to be made to cover ferry or trap cars.

Asks for Information

In forwarding this tariff to the State railroad commissions, Secretary Charles E. Elmquist of the special war committee asks for an immediate report concerning the probable effect the charges will have upon the business, industries and revenues of the several States in order that the Director General of Railroads may be fully advised before putting the new charges into effect. Mr. Elmquist adds that it is estimated that the new tariff will increase railroad revenues approximately \$175,000,000 per annum, but these figures are regarded by railroad experts as decidedly conservative. Several traffic experts, who have analyzed the new tariff declare very positively that it will produce nearly twice the estimated amount. Taking the gross freight revenues of the roads at \$2,500,000,000 and assuming that 90 per cent of the freight movement is in carloads and that 60 per cent of the carloads are delivered to plants having private rail terminals and applying the average round trip freight car earnings of \$24 to the equation, it is figured that the additional charges will total not less than \$336,000,000. The contribution of the iron and steel industry is estimated at 40 per cent of this large sum, or \$134,400,000 per annum.

Although the Director General's new spotting tariff has not yet reached all State railroad commissions, protests by mail and telegraph are already pouring in from commissions located in the eastern States, and experienced observers here express serious doubts as to whether the Director General will finally adopt the

tariff in view of the strong opposition already voiced. It is also suggested that if the new tariff should be formally promulgated, many industrial plants would retaliate by installing their own spotting equipment, or by accepting deliveries on the trunk-line tracks or in the carriers' break-up yards.

Plan for Purchasing

The organization of the Division of Finance and Purchases, which has just been completed by Director General McAdoo, contemplates the centralization of all important railroad purchases in this division, but for the present, at least, the purchasing departments of roads will do their own buying for current needs, although required to submit contracts for extended periods for official approval.

According to the detailed plan announced by Mr. McAdoo, the Director of the Finance Section will be assisted in the work of investigating and providing plans to meet the financial requirements of the railroads throughout the country, whether these needs relate to the taking up and renewal of maturing obligations and the issuance of new securities or providing for betterments and additions, by an advisory committee of three men, experienced in finance, who will be selected, one from the North, one from the West, and one from the South. These men, whose names will be announced later, will serve the Government without compensation, and will have offices in Washington.

The gross earnings from operations of the railroads of the country for the calendar year 1917 amounted to something over \$4,000,000,000, but the requirements for new capital, outside of revenue from earnings, for new equipment, betterments and additions, have usually called for from \$250,000,000 to \$750,000,000 per annum, according to the activity of business and the condition of the money market.

Duties of Purchasing Section

In outlining the duties of the Purchasing Section, Mr. McAdoo states that in the matter of making purchases for the railroads, which will amount to between \$1,000,000,000 and \$2,000,000,000 per annum, the Director of the Division will be assisted by an advisory committee of three, which will be composed of the general purchasing agents or vice-presidents in charge of purchases of three leading railroad systems, who will be detailed to Washington for this work, under the supervision of the Director of the Division.

There will also be constituted three additional committees; these committees to be composed of three or more general purchasing agents, or men experienced in this work, to be known as the Regional Purchasing Committees, with headquarters in New York, Chicago, and Atlanta, in touch with the Regional Directors of these three districts.

All purchases of locomotives, passenger, freight, and other cars, and steel rails will be made directly through the office of the Director of Purchases.

In the New England territory, fuel purchases will be made by a special committee appointed by the Regional Director under the direction of the Washington office. In other sections, each railroad will be expected to handle its requirements, under the immediate direction of the respective regional purchasing committees, either collectively with other companies, or separately, as may be directed by that committee. The details of all contracts already made and of all other contracts as made will be scrutinized and checked by the regional purchasing committees, which will act under the general direction of the Central Committee.

Cross ties and lumber which can be obtained along the lines of the respective roads will be negotiated for and purchased through the purchasing departments of each road, under the supervision of the regional purchasing committees. Cross ties needed by the various roads which cannot be obtained on their own lines will be purchased through the Washington office.

Roads Will Do Buying

All other supplies needed for current operations will be purchased, for the time being, through the pur-

chasing departments of the respective roads, but all contracts for periods of six months or longer must be approved by the regional committees before completion. Information as to the prices paid for all supplies will be furnished monthly by all roads to the regional purchasing committees, so that the prices paid by each road for all articles may be carefully compared and checked, both as to prices, standards, qualities, and places of delivery. The regional purchasing committees will address themselves, as soon as possible, to consideration of the opportunities for standardizing and consolidating purchases of every kind that may admit of such treatment, with a view to increasing efficiency and economy. The regional purchasing committees will submit to one another and to Washington, as information and for criticism, full statistics as to cost prices of materials used in railroad operations, and these prices will be carefully compared and checked.

The names of the Advisory Committees in the Sections of Finance and of Purchases, and the names of the three Regional Committees will be announced in a few days.

Detailed Information Requested

The questionnaire sent out by the Director General of Railroads for the purpose of securing information concerning obsolete locomotives which may be repaired for service on roads of less traffic density or more favorable operating conditions than those from which they have been withdrawn, calls for minute details. Under the head of "Character of Locomotives" the roads are required to report the number, age, type (passenger, freight, switching or work), classification with respect to wheel arrangement and whether employing as fuel anthracite or bituminous coal, lignite or fuel oil. Under the heading of "Power of Locomotives" the roads will return cylinder diameter and stroke, steam pressure carried, diameter of driving wheels outside of tires, tractive power, weight on drivers, and total weight of locomotive in working order. Dimensions of locomotives, including maximum width, height and length, are also called for. The most important feature of the questionnaire contemplates a detailed report of the general condition of boilers, fire boxes and machinery and the approximate cost to repair each. Similar information is also called for regarding tenders.

It is believed that by the adoption of a standardized system of repairs to all obsolete engines which can be rendered serviceable for any purpose the Director General will be able to secure a comparatively large number for effective service. It is reported there are thousands of locomotives in the possession of the larger railroad systems which can not be economically repaired for service on those systems but which can be put in condition for use on smaller roads with an expenditure fully justified by the existing transportation emergency.

W. L. C.

Magnesite from Venezuela

The Magnesite Products Corporation, of which Chas. E. Doddridge, New York, is president, is planning to undertake the operation on a large scale of the deposits of magnesite it acquired in 1916. The company owns 7000 acres of land and estimates that 300,000 tons of crude magnesite are in sight. An average analysis shows 48.31 per cent magnesium oxide, 0.43 per cent iron, 0.44 per cent calcium and 50.03 per cent carbon dioxide. The deposits lie along the beach and will be mined by open pit methods. At present crude magnesite will be shipped to the United States but later it is intended to calcine the product on the island. Shipments at the rate of 1000 tons a month are planned for the present year to Atlantic ports in the United States.

The British Trade Commissioner reports that the royal commission appointed last June to inquire into the advisability of establishing state iron and steel works in Queensland has recommended to establish a state plant capable of producing pig iron commercially and to be used for the purpose of testing in bulk the iron ore deposits of the state.

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EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

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Waste in Fuel and Iron Industries

The theory is accepted widely that the tremendous waste in war should be made up as far as possible by the most rigid economy at home. Various Government agencies have been preaching economy to the people. The people are willing, even anxious, to economize. They have reasons in addition to that of patriotism.

The fact should be emphasized that the Government has great opportunities to bring about economies that cannot be compassed by the voluntary act of the people. There may be too many boards and administrators already, but a national Director of Economy, if his word could be made law, would find much to do and would render most valuable service. Attention has already been directed to a few of the possible economies, and some effort is being made to improve conditions, but there is room for a great deal harder work.

The true economy is not in the saving of money but in the saving of physical effort and material. Winning the war is all that counts, and it is a minor matter whose pocketbook may be affected favorably or unfavorably. On no less authority than that of the Bureau of Mines it is given out that of the reported bituminous coal shipments last year as much perhaps as 50,000,000 tons, or 9 per cent, was not coal at all, but refuse matter, chiefly slate. This is material that in normal times would not be shipped as coal. Instead of economy being practiced, as compared with normal times, there has been extravagant waste of effort and material. The refuse matter had to be hauled on the railroads, which have been the neck of the bottle in most industrial affairs for a long time past, and when it reached destination it not only served no useful function but decreased the efficiency of the remaining coal. By an order issued late last week the experiment is to be tried of empowering district representatives of the Fuel Administration to appoint inspectors to tour the mines in their districts.

Both in the production of coke and in its use there has been much waste. There is general testimony to the fact that on account of irregular car supplies at coke ovens much coke has been held in ovens too long, whereby its quality was below standard or the material was burned entire-

ly and could not be used. In the latter case there was a total waste of the coal that had been charged into the ovens, while in the former case there was a partial waste of the coal, followed by a further waste in the use of transportation facilities for material that was not able to render service, in the blast furnace, commensurate with the weight transported.

Apart from the waste at blast furnaces occasioned by the forced use of coke that was not up to standard, there has been a great waste of coke through furnaces being unable to operate in economical manner. When a furnace operation is slowed down the coke consumption per ton of pig iron is increased. Even then it has been impossible for furnace managers at all times to slow down operations to correspond with the irregular supplies of coke. Frequently it has been necessary to bank furnaces, involving a total waste of a certain amount of coke.

Thus at the very time that coke is scarcest, and actually as a result of the scarcity, the amount of pig iron produced per ton of coke consumed has decreased. The curtailment in pig-iron production in the past few months has not been in direct ratio to the curtailment in the supply of coke. It has been in greater ratio. At a time, for instance, when the total supply of coke to the blast furnace industry is 80 per cent of the normal requirements of the furnaces in blast, the production of pig iron is probably only between 65 and 70 per cent of the normal output of these furnaces.

Nor does the waste stop there. Metal mixers must be kept hot. Open-hearth furnaces must be kept hot. If the open-hearth furnace is out of operation through its attendant blast furnace being unproductive it is still consuming coal, perhaps 15 per cent as much as when it is engaged in producing steel. Here is a waste of coal when coal at consuming point is almost priceless.

The waste continues through other processes. Shipping facilities for finished steel products have been quite insufficient and the production of finished steel has had to be curtailed. Frequently the blast furnace has outrun the gait that would take care of the finished steel that could be shipped and the works has had to accumulate ingots. The ingots must eventually be reheated,

consuming coal that is a dead loss as compared with efficient operation.

In the finishing mills and in mill warehouses and yards, the accumulation of product awaiting shipment has been an incumbrance. Much re-handling has been forced, and that is a waste of labor.

The iron and steel industry has had no opportunity to complain or protest. There is no channel. When prices the producers are to be permitted to charge are under discussion, cost sheets can be shown and all that producers can do is to argue that, seeing they have such costs they should be permitted to charge prices that will cover the costs. If there were a Director of Economy the War Industries Board could place the matter before him, on the ground that lower prices were desired, but the costs were too high and the manufacturers were powerless to reduce them.

The winter furnished all varieties of bad weather and there was no means of judging the future. The troubles, one after another, seemed to be only temporary. Winter is now past and the Government and industry have to deal with things that can be seen and foreseen. These wastes are largely preventable. If certain things really cannot be done, the cloth should be cut accordingly. If sufficient material cannot be furnished for operating all plant units efficiently, some should be closed; but every effort should first be made to operate them in full. The situation should be faced squarely. The time for temporizing, for waiting for better weather, is past. A plain program should be mapped out.

The Third Liberty Loan

The great importance of making the third Liberty Loan a decided success is so well known to all who are connected with the iron and steel business that it is entirely unnecessary to exhort such men to do their duty. THE IRON AGE desires, however, to do anything in its power to promote the buying of Liberty bonds and will gladly devote all the space necessary to reporting the news connected with the campaigns which will be in progress in industrial plants throughout the country beginning April 6. We especially desire to publish any suggestions which those who have had experience in past campaigns may have to offer as to the best way of carrying on the new campaign.

Although taken as a whole the plants manufacturing iron and steel products made splendid records in the first two Liberty loan campaigns, some companies did much better than others. This we believe was due largely, not to varying degrees of patriotism of employers and employees, but to better methods of organization for selling bonds in some plants than in others. Short articles giving suggestions as to the best methods of organization will be published.

Some mistakes were made in past campaigns, and it would be well to know what not to do as well as to know what to do to bring about the best results. One form of propaganda which has come under our observation—the circulation of a leaflet urging workmen to be loyal and not to strike—

is peculiarly ill-timed. There is danger of its arousing in employees a feeling of resentment, although, of course, the author of the appeal was actuated by the highest motives. Anything of a patronizing character is especially to be avoided.

As one feature of the propaganda among readers of THE IRON AGE, a number of our advertisers have donated their space in the issue of April 4 to the marshaling of telling arguments for large subscriptions to the third loan from iron and steel and metal-working industries. As a part of its own effort in the same campaign, THE IRON AGE will devote a section of the advertising pages in each of the subsequent issues of April to the new loan, putting in the most effective way we can devise, the country's claims upon the great industries this journal represents.

Germany and Manganese

Germany's manganese problem apparently has been solved—for a time. That this problem has been a serious one is well known. Manganese for steel and munitions is regarded as a metallurgical necessity. Germany's supply by the end of the second year of the war was probably exhausted, as indicated in a discussion in THE IRON AGE of Dec. 28, 1916, although previous to the war she had accumulated large quantities of high grade ore from foreign sources. What means she has resorted to or what substitutes, if any, have been found in the last year or two are unknown. That her steel has been of inferior grade as a result cannot be demonstrated; at least the rain of effective shells has not abated.

The peace treaty with the Republic of the Ukraine has opened up to Germany large quantities of high grade manganese ore. These deposits, at Nikopol on the river Dnieper, have yielded one-fifth of the total output of Russia. Of probably more importance to Germany, however, are the manganese mines of the Russian Caucasus which before the war produced one-half of the world's supply. By the terms of the treaty Germany forced upon Russia, this territory is again a part of Turkey. Turkey being Germany, these vast deposits are also under German control.

Before the war only 40 per cent of Germany's steel output was open-hearth, while 57 per cent of it was Bessemer. While ferromanganese made only from high grade ore is essential in open-hearth practice, spiegeleisen is adequate in Bessemer. Therefore Germany's manganese problem has not been as acute as would have been the case in the United States under similar circumstances, with open-hearth steel so greatly predominating. Germany has abundant supplies of manganiferous iron ores; so has the United States. Germany now has opened up to her vast supplies of high grade ore. The United States is practically dependent on Brazil. Unless some metallurgical solution is developed, the steel industry of this country will be at a disadvantage as compared with that of Germany; conceivably it might be in peril.

At a meeting not long ago of the German steel syndicate the statement was made that "a safe supply of iron and manganese ore must be kept in

the foreground at the peace negotiations, for on this hangs the continued existence of Germany industry, the German state and the German people." Temporarily one aim of the war has been attained, or its attainment is in the German grasp.

Women in Munitions Work

While conditions in this country by no means have reached the point that made wholesale employment of female labor in munitions factories a necessity, as in England, an increasing number of American manufacturers are substituting women for men in the lighter forms of work. England has employed women on work as laborious as the machining of 6-in. shells, but their employment in this country has been largely confined to fuse work and similar operations which can be performed on drill presses, screw machines and other smaller tools.

A Dayton, Ohio, factory is employing close to 5000 women in this manner; a Baltimore, Md., munition maker now has about 1800 at work, and in various other industrial centers women are being employed in gradually increasing numbers. A Bloomfield, N. J., fuse maker is now seeking a considerable force of women and the factories of Jersey City, N. J., have decided to try them as a means of solving the labor shortage there. At a meeting of Jersey City manufacturers to discuss the labor question the statement was made by the employment director of the city of Rochester, N. Y., that machine shops in his city had found women more efficient than men in certain classes of work. He said that there is a "wonderful field for women in the machine shop."

Varying conditions have led to the employment of women. In some cities employers have been driven to it by the shortage of male labor. A Baltimore manufacturer believes it to be patriotic policy to employ women on work which they can do as well as men, so that more men may be released for the shipyards and other heavier forms of labor where women cannot so satisfactorily be used. In most cases the women receive the same pay as men for the same work. Fuse makers in particular report that women have more patience with such small operations as drill press work, which becomes deady monotonous to men workers.

In some of the industrial centers of the East there is no acute labor shortage, the gradual reduction of forces in non-essential industries having released a considerable number of men for the war industries.

The recent demonstrations of the Browning guns are not alone significant of a high development of American mechanical skill. The efficiency and dependability of these guns are also the result of attention to metallurgical detail of the most exacting nature. Several grades of carbon and alloy steel enter into their various parts. The types of steel best suited to the various functions to be performed have been carefully selected. Carbon, high-manganese and chrome and nickel steels are all represented. Also, for each gun part a definite heat treatment is prescribed by a

well-organized metallurgical department and this is carried out on a large scale by pyrometric and microscopic control. All steel purchased is subject to careful examination in addition to representative tests, before it is allowed to get into the manufacturing process. Even the details of the formation of the brass cartridges are regulated by a heat treatment program calculated to produce a strong metal having a proper grain structure. The importance of composition and of grain structure in attaining maximum results is especially emphasized in the high performance of the finished gun, which points the way to new successes with steel in other fields.

Steel Production Gains

The monthly report of the American Iron and Steel Institute referring to ingot production shows that in February 29 companies produced 2,289,901 tons. In 1916 these same companies produced 88.14 per cent of the country's total, and assuming that the same proportion held in February the indicated production for the industry is 2,600,000 tons. At 24 working days for February and 309 for a year this would represent an annual rate of 33,530,000 tons. The January output, similarly treated, would indicate an annual rate of 28,600,000 tons.

Thus, on the surface, there was a great improvement in steel production. However, as was pointed out in this department when the January ingot statistics were published there was the influence of the Garfield holidays, and if they were counted as representing the equivalent of four days of complete idleness, taking the month at 23 working days instead of 27, the annual rate indicated in January would be 33,600,000 tons, or approximately the same rate as is now shown for February.

Reference to the monthly pig-iron production reports of THE IRON AGE will throw a little light upon what really occurred. In 1917 the excess of ingot production over pig-iron production was 10.5 per cent. The production of coke and anthracite pig iron was 2,411,768 tons in January, this year, and 2,319,399 tons in February. Adding 10.5 per cent to get the ingot expectation on the basis of 1917 experience, there would be 2,665,000 tons of ingots in January and 2,565,000 tons in February. Production as actually reported fell short 175,000 tons in January and ran 25,000 tons in excess in February. Thus there appears to have been a net deficiency of 150,000 tons of ingots, in proportion to pig iron, and this may represent an addition to much-needed stocks of pig iron.

Disregarding holidays and regarding a month simply as a month, the ingot production in the first two months of this year represents an annual rate of 30,500,000 tons. A conservatively low estimate of capacity is 47,000,000 tons, some estimates running up to 50,000,000 tons. At 47,000,000 tons' capacity, production in the first two months of this year represented 65 per cent of capacity. With a rate of 33,530,000 tons in February, however, a rate well above 35,000,000 tons may be ex-

pected for the present month, or a rate well above 75 per cent of capacity. The only visible influence restricting production lately has been the traffic situation, but as conditions improve in this respect other barriers to 100 per cent operation will no doubt be disclosed. Not the least inconsiderable of the possibilities is a lack of sufficient orders in certain lines.

CORRESPONDENCE

To Save Coal in the Power Department

To the Editor: During the last quarter of a century much has been done and said in the field of industrial management and the managerial mechanism developed proved beyond doubt that it is nothing but a mechanism, and as such may or may not produce the desired results, depending on how and by whom this mechanism is used.

The management of power plants drags in the tail of the procession probably for two reasons: 1—Because of the fallacy that good equipment necessarily produces good results; 2—Because financial interests consider the cost of power an insignificant item of the total expense.

Now, when we feel the pinch of the shortage of fuel and when this shortage not only enhances the cost of power but endangers the very existence of various industries, even the health and well-being of communities, these fallacies must be disposed of at once. *It is not the equipment and supplies that produce results but the mode of their use.* When this is realized two problems present themselves to power engineers: 1—To secure mechanism for modern management; 2—To make proper use of it.

Securing of managerial mechanism involves the assuming of responsibility by the plant owners since it is obviously their task to provide the plant with the means to study the causes and effects, to standardize the best practice and to keep adequate and dependable records. Securing the result of the mechanism involves the education and training of the employees to make proper use of the available knowledge. Furthermore, they must have permanent and sufficient incentive for learning the better way, taught them by an enlightened management and living up to it. Under such conditions the executive is relieved of all the worries as to routine details as these are standardized and can be well taken care of by subordinates. The major part of the time of the executive may thus be devoted to solving special problems and to further the improvements of the managerial mechanism and its working.

The results accomplished in the plants which have adopted these principles are permanent since they are worked out from the bottom up and economy accomplished varies all the way from 15 to 50 per cent, depending upon the shape in which the plant was originally found.

To meet the present emergency, both as to men and fuel, the first thing to do is to put the house in order after a thorough study so that the methods may be based on facts, not on opinions and traditions. When this is done enough room will be found to build up the efficiency and leave alone "better equipment" and other patent cures.

WALTER N. POLAKOV.

31 Nassau Street, New York.

Repairs at No. 2 blast furnace of the Steelton, Pa., plant, Bethlehem Steel Co., which have been under way for about a month, are near completion. The furnace will be put into use in about two weeks. Work on the erection of additional coke ovens at the Steelton plant will be completed in June.

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Steel Conference in Washington March 20

The Outlook for a Longer Price Period—Pooling Plan Less in Favor and Pomerene Bill Is Used as Leverage

WASHINGTON, March 12.—The War Industries Board has invited the general committee on steel and steel products of the American Iron and Steel Institute to confer with it in Washington on March 20 concerning the extension and possible revision of the schedule of controlled prices which expires on March 31. The conference will also be participated in by J. Leonard Replogle, director of steel supply, and by representatives of the Federal Trade Commission and the Fuel Administration. Bernard M. Baruch, who has just assumed the duties of chairman of the War Industries Board, will preside.

Interest in this conference is concentrated on three points, namely, the price tendency of the schedule as revised, the period during which it will be in force, and the possibility that some basis may be worked out for pooling the output of producers so that large and small manufacturers alike may secure a reasonable margin of profit while the products of the industry are purchased by the Government and private consumers at flat prices. There is certain to be a spirited contest over prices, the manufacturers on the one hand presenting convincing evidence of steadily rising costs, while Chairman Baruch will be expected to maintain as aggressively as possible his reputation as a close trader. It should be said in this connection, however, that Mr. Baruch's reputation rests quite as much upon the work of certain Washington newspaper correspondents, possessing more zeal than knowledge of the industries concerning which they have written, as upon low prices obtained in past negotiations.

Cost Increases a Factor

The cost sheets to be laid before the War Industries Board as a basis for the coming conference will undoubtedly show very substantial increases in every department. When the present schedule was revised late in December the Federal Trade Commission did not have before it any figures showing costs during the closing month of 1917. By March 20 the War Industries Board will have complete figures for December and January and a sufficient array of typical costs for February to permit close approximations to be made for the entire month. Substantial increases will be shown in December and in January, while throughout February the curve rises sharply, due to a combination of the general upward tendency of recent months and the effect of the extraordinary conditions brought about by railroad congestion, the Garfield shutdown, and fuel and labor shortage.

It may be assumed that the argument of the War Industries Board, under Mr. Baruch's leadership, will attempt to discount heavily all increases in cost of production that may be related in any way to abnormal conditions during the past three months. It can safely be asserted that in view of measures already taken by Congress and by the Director General of Railroads the transportation situation that has prevailed during the past 90 days will not recur during the period of the war. No extension of the existing price schedule likely to be made at the coming meeting will carry producers into another coal famine. Finally, the board may be expected to emphasize the fact that the demand for steel products, except from Government sources, has steadily grown lighter in recent weeks and that as railroad buying is no longer a factor in private

demand, there is likely to be no real competition with the Government for the steel output.

Pooling Plan Not Greatly in Favor

The possibility that the War Industries Board may suggest a pooling of the entire output of the industry, based on purchases made at varying prices showing reasonable profits to all producers, regardless of their costs, while still a matter of much interest is now regarded as more remote than when this plan was last discussed by the board in some detail two months ago. At that time Daniel Willard, to whom the pooling project appeared to appeal strongly, expressed the hope that before the schedule of controlled prices, which had then been extended to March 31, should again expire some practicable method might be worked out whereby the maximum of production could be secured without adopting a price level that would represent inordinate profits to the big, fully integrated concerns. Mr. Willard had broached this matter to the steel men at the conference late in December, but as the schedule was about to expire it was obvious it was impracticable in so short a time to work out what must necessarily be a very complicated problem.

Mr. Willard's retirement from the War Industries Board has been followed by a reaction in the opinion of certain of its members, if not of a majority, respecting the desirability and practicability of the pooling plan. The fact that it would necessitate the getting together of an enormous organization for accounting and inspection purposes, doubtless requiring legislation by Congress and a very large appropriation, is admittedly a strong point against it. Certain officials also criticize any pooling plan based on prices fixed by margins over cost as a "premium on inefficiency," and almost as objectionable as the system of cost-plus-profit contracts against which Congress has now begun to legislate. To meet the contention that to bring out 90 per cent of possible production of concerns having a right to exist in the iron and steel industry, a level of prices must be fixed at which the big operators producing upward of 60 per cent of the output of the industry would secure exorbitant profits, the suggestion is made that the corporate income and excess profits taxes, now on the statute books and likely to be further increased during the coming summer, may be counted upon to absorb abnormal gains and equalize the earnings of the big and little corporations. This suggestion, it should be said in passing, apparently does not give full weight to the fact that the excess profits tax is based not upon the amount of profits of a corporation but upon the ratio between those profits and the invested capital.

The Maximum Production Issue

The intimation has also been heard here recently that because of the slackening of private demand it will not be so important, in the near future at least, to secure maximum production throughout the industry. Those making this point, however, overlook the specializing tendency that has marked the demand since the Government became the leading buyer of steel. All capacity in certain directions will be tested by the Government demand and the output of the small concern making material used in the conduct of the war will be regarded as essential.

Members of the War Industries Board have not yet developed any definite ideas as to the period for which the schedule of controlled prices should again be extended and will approach that point at the coming meeting with fairly open minds.

Extended Period Favored

The attitude of the steel men as to prices will have an important bearing upon the length of the extension. If it is insisted that new rates be based on recent cost tendencies the board will be disposed to favor a short extension, as it will count on substantially lower cost sheets after April 1, if indeed the month of March does not show a downward tendency. While favoring an extension of six or nine months on the general ground that a comparatively long period would tend to stabilize the industry, the board is not likely to permit this consideration to weigh very heavily in view of the fact that the Government will be the principal buyer and must have its wants satisfied at prices which can be defended before the people, irrespective of the effect of the terms of the agreement upon the producers or upon private consumers. The suggestion that has been made that the price agreement be extended for the entire period of the war does not appear to have been seriously entertained here.

Moral Effect of Pomerene Bill

The Pomerene bill, authorizing the Government to fix iron and steel prices and under certain conditions to take over the output of the industry, if not dead, is dormant, pending the development of a situation making it necessary to abandon negotiations between the War Industries Board and representatives of the iron and steel producers for a more drastic method of buying for the Government. The friends of the bill in the Senate express the opinion that its introduction and discussion have already served a good purpose and that its pendency will doubtless have a salutary effect upon any negotiations that may be undertaken from time to time. As a matter of fact, it has not been practicable to make any progress with the Pomerene bill because of the congested condition of the Senate docket and of the docket of the Committee on Interstate Commerce. Both the Senate and Committee have been devoting their time since the holiday recess almost exclusively to railroad legislation and other interstate problems of great urgency, and it would have been impossible to give adequate consideration to the Pomerene bill in time to secure its passage before the expiration of the steel price schedule. The advocates of the bill, however, insist that it has not been abandoned and that it will be heard from later in the session.

It is not without significance in this connection that a number of proposals for governmental price fixing brought forward in connection with the bill just reported from the House Committee on Agriculture supplementing the Lever food, feed and fuel control act were abandoned in committee and are not likely to be seriously urged on the floor of the House. These proposals authorize the Government to fix the price of many commodities, including tools of all kinds, household utensils, etc. It should also be noted in this connection that the Government has not as yet shown any disposition to utilize the authority conferred upon it by the original Lever act to attempt the control of the manufacture and distribution of "tools, utensils, implements, machinery and equipment required for the actual production of foods, feeds and fuel." This statute was enacted Aug. 10, 1917, and under its provisions both the food and fuel administrations have since been operated.

W. L. C.

Effective March 7, the Reading Iron Co., Reading, Pa., has commenced the operation of its Keystone furnace, which has been idle since last September. The plant has a capacity of about 2100 tons of pig iron weekly.

Germany and the Manganese and Iron of the Ukraine

The German peace with the Ukraine has probably opened up important mineral supplies to Germany which are much needed. This is particularly true of manganese ore. Discussing this treaty in its effects on Germany's supplies of manganese ore and iron ore, the London *Ironmonger* has the following to say:

"One article of vital importance for munition work of which Germany is in sore need is believed to be plentiful in the Ukraine. This is manganese ore, of which Russia is the largest producer in the world. The great storehouse of manganese is the Tchiaturi mines in the Caucasus, producing before the war about one-half of the world's supply, of which, again, one-half was shipped to Germany from the port of Batum. With the war this port was sealed to the outer world and enormous stocks accumulated. At the end of 1916 there were 723,000 tons of ore at the mines and 48,000 tons at Batum. This is far away from the Ukraine, it is true, but it is by no means certain that these supplies will continue to be out of Germany's reach. In the Ukraine itself, however, at Nikopol on the Dnieper, there are also large manganese ore deposits, yielding about one-fifth of the total production of the country, and last autumn it was reported that these mines were idle because the Russian steel works were no longer able to use up their product, and that here also there were very large stocks for which no market could be found. There will now be market enough for them if they can be transported to Germany.

"Southward from the city of Kharkoff stretches the principal coal field of Russia, and the largest iron-ore beds of the country are also in this district. There, again, during the last 12 months the output has outgrown the capacity of the blast furnaces to work up the ore, and in July, 1917, the mine owners reported that, owing to the extravagant demands for increased wages, they would probably have to close down. The Krivoi-Rog mines, which have a normal annual production of 6,000,000 tons of ore averaging 62 per cent, were then turning out 90,000 tons monthly in excess of what the furnaces could take, and the stock at the mines was equal to six months' requirements of the works. The normal yearly production of the 18 great iron works in south Russia, employing about 125,000 workers, is 3,000,000 tons of pig iron and about the same tonnage of manufactured products, but since the revolution it has fallen to a fraction of these figures. The Krivoi-Rog iron-ore field, as well as the less important field of Kertch in the Crimea, which has important deposits of hematite ore of about 35 to 40 per cent, is largely worked by foreign companies, mainly Belgian, French and (before the war) German. It is worth recalling, as showing the antiquity of the Russian iron industry, that Russian pig iron was one of the first products sent regularly to western Europe when the country was opened up to foreign trade in the days of Peter the Great and that this export trade and that in Russian bar iron continued until the rise of the modern iron and steel industry in England in the first quarter of the nineteenth century."

Canadian Plants Busy

TORONTO, ONT., March 12.—That all steel plants in Canada will probably be operating at full capacity throughout the present year under heavy demand and that large new munitions contracts are expected from the United States and Great Britain, are opinions expressed by Col. Thomas Cantley, Chairman of the Board of Directors, Nova Scotia Steel & Coal Co. The production of steel ingots and direct steel castings in Canada in 1917 was approximately 1,700,000 tons, creating a new record, the previous banner year for the Dominion being 1916, when about 1,300,000 tons were produced. The pig iron production likewise advanced in 1917 to 1,200,000 tons. About 13,000 tons of this came from electric furnaces. The electric furnace accounted for 45,000 tons of steel last year, as against 19,000 tons in 1916.

Iron and Steel Markets

LARGER WAR STEEL NEEDS

A Factor in the Coming Price Conference

Government Car Buying Imminent—Consumptive Demand Very Small

The naming of Wednesday, March 20, as the day for the price conference at Washington, between the steel manufacturers and the War Industries Board, is bringing to a head the issues raised by various producers. The diverse interests of the small producers, who must have a high price, and of the largest integrated companies, who can go on on the present basis, are more sharply accented.

Favoring weather has put up the production of pig iron and steel but the derangement and insufficiency of transportation still stand out everywhere. There is little dissent, therefore, from the view that the industry will fall considerably short of capacity production in 1918. At the same time, demand for other than war purposes is meager, and in some lighter products the outlook for mill operations is not so promising.

Meanwhile, plans are developing rapidly at Washington for larger steel requirements for the second half of the year. The shell-steel tonnage for that period is estimated at 2,500,000, as against 1,500,000 tons for the first six months. The Government is about to place the first of the 150,000 cars and 2500 locomotives in its program, and the standard types of steel freight cars have been agreed upon. A good many 70-ton cars are wanted, so that car and locomotive requirements in steel are put at 2,000,000 tons. The shipyards are expected to take twice as much steel in the second half of the year as in the first half.

Car builders have barely a month's work left. In the six general types of cars now agreed on an effort has been made to reduce materially the use of wide plates suitable for shipbuilding and universal plates may be used for much of the pressed forms. Car manufacturing costs will probably be made the basis of contract figures, and prices for car wheels, axles, etc., will be fixed.

On the order books of the rail mills are 3,000,000 tons for 1918, and on these deliveries are now behind. Canada wants 208,000 tons, and her mills can furnish but a small part. Some of these rails would now be going into American mills but that the Canadian Government demurred at the prices asked. Incidentally, this year's rollings will turn out badly for one or two mills whose costs are well above the \$40 basis for open-hearth rails.

Great Britain's plate inquiries have now increased to 300,000 tons. Slabs would be taken for part of this, as British plate-mill capacity is available.

Contracts now in the hands of steel producers from all sources represent about eight months' production, but are not evenly distributed over that period. With the heavier Government buying promised for the second half, the need of all the steel that can be made might be inferred, but the ques-

tion of full demand for all the lighter products is still an open one.

The crux of the situation, as it will come before the price conference next week, is the country's ability to produce sufficient pig iron. A higher price is being urged by smaller furnace companies. On the other hand, some buyers of pig iron ask that the price be reduced, particularly on Southern iron.

A prime factor in all calculations as to steel for the second half of the year, which has not had sufficient emphasis thus far, is ability to increase the shipbuilding program, as well as to transport to Europe the larger tonnage of munitions and of plates and other finished products involved in present plans.

The 30 per cent "curtailment" in passenger automobile production agreed on by manufacturers and the War Industries Board means little change, in fact, from the recent scale of operations, due to falling demand. Only two large makers are named as likely to cut down present output. The sentiment is growing in some Washington quarters that a considerable part of the alloy steel now going to the automobile industry should be conserved for war steel uses.

Exceptionally heavy orders have gone to the mills in the last two weeks for ship material. Some plate mills have full bookings for all the first half.

A transaction which throws light on the shortage of pig iron is the purchase for the Steel Corporation's basic steel works at Pencoed, Pa., of 35,000 tons of standard Bessemer iron which had been lying for months at an Eastern port awaiting shipment to France. At \$36.30, the official price for Bessemer iron, \$3.30 more per ton was paid than basic metal would bring, but basic iron could not be had.

At a meeting of pig-iron manufacturers, to be held in New York, March 14, a number of smaller blast furnace companies will urge their claims for a higher Government price. There is also the view of some larger merchant pig-iron producers that with not enough coke to go around, the better equipped furnaces should get more, while the highest-cost furnaces should go out of blast.

A large Eastern consumer of Lake Superior ore contracted for about 1,000,000 tons last week, but most consumers are waiting to get a better idea of the amount by which they can cut down last year's purchases. Stocks in blast-furnace yards greatly exceed those of one year ago.

Pittsburgh

PITTSBURGH, March 12—(By Wire).

A meeting of the American Iron and Steel Institute Committee on Steel and Steel Products is to be held with the War Industries Board at Washington on Wednesday, March 20. While nothing is known by the committee as to what the War Industries Board will do in the matter of revising or reaffirming present prices, it is believed in the trade here that present prices will be allowed to stand, and possibly for six to nine months. In fact, the steel manufacturers' committee may be expected to impress strongly on the War Industries Board

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron,	Per Gross Ton:	Mar. 13 1918	Mar. 6 1918	Feb. 13 1918	Mar. 14 1917
No. 2 X, Philadelphia...	\$34.25	\$34.25	\$34.25	\$36.50	
No. 2, Valley furnace...	33.00	33.00	33.00	36.00	
No. 2 Southern, Cincin...	35.90	35.90	35.90	31.90	
No. 2, Birmingham, Ala...	33.00	33.00	33.00	29.00	
No. 2, furnace, Chicago*	33.00	33.00	33.00	35.00	
Basic, deliv., eastern Pa...	33.75	33.75	33.75	33.50	
Basic, Valley furnace...	33.00	33.00	33.00	32.00	
Bessemer, Pittsburgh...	37.25	37.25	37.25	36.95	
Malleable Bess., Chicago*	33.50	33.50	33.50	35.00	
Gray forge, Pittsburgh...	32.75	32.75	32.75	32.95	
L. S. charcoal, Chicago...	37.50	37.50	37.50	36.75	

Billets, etc.	Per Gross Ton:	Mar. 13 1918	Mar. 6 1918	Feb. 13 1918	Mar. 14 1917
Bess. rails, heavy, at mill.	55.00	55.00	55.00	38.00	
O.-h. rails, heavy, at mill.	57.00	57.00	57.00	40.00	
Bess. billets, Pittsburgh...	47.50	47.50	47.50	65.00	
O.-h. billets, Pittsburgh...	47.50	47.50	47.50	65.00	
O.-h. sheet bars, P'gh...	51.00	51.00	51.00	65.00	
Forging billets, base, P'gh	60.00	60.00	60.00	90.00	
O.-h. billets, Philadelphia...	50.50	50.50	50.50	65.00	
Wire rods, Pittsburgh...	57.00	57.00	57.00	80.00	

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	3.685	3.685	3.685	3.659
Iron bars, Pittsburgh...	3.50	3.50	3.50	3.50
Iron bars, Chicago	3.50	3.50	3.50	3.00
Steel bars, Pittsburgh...	2.90	2.90	2.90	3.75
Steel bars, New York...	3.095	3.095	3.095	3.919
Tank plates, Pittsburgh...	3.25	3.25	3.25	5.25
Tank plates, New York...	3.445	3.445	3.445	5.479
Beams, etc., Pittsburgh...	3.00	3.00	3.00	3.40
Beams, etc., New York...	3.195	3.195	3.195	3.569
Skelp, grooved steel, P'gh.	2.90	2.90	2.90	3.50
Skelp, sheared steel, P'gh	3.25	3.25	3.25	3.75
Steel hoops, Pittsburgh...	3.50	3.50	3.50	4.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Per Lb. to Large Buyers:	Mar. 13 1918	Mar. 6 1918	Feb. 13 1918	Mar. 14 1917
Sheets, black, No. 28, P'gh	5.00	5.00	5.00	5.00	
Sheets, gal., No. 28, P'gh	6.25	6.25	6.25	7.00	
Wire nails, Pittsburgh...	3.50	3.50	3.50	3.20	
Cut nails, Pittsburgh...	4.00	4.00	4.00	3.70	
Fence wire, base, P'gh...	3.25	3.25	3.25	3.15	
Barb wire, galv., P'gh...	4.35	4.35	4.35	4.05	

Old Material:

Per Gross Ton:	Mar. 13 1918	Mar. 6 1918	Feb. 13 1918	Mar. 14 1917
Carwheels, Chicago	\$30.00	\$30.00	\$30.00	\$20.25
Carwheels, Philadelphia...	30.00	30.00	30.00	21.00
Heavy steel scrap, P'gh...	30.00	30.00	30.00	22.00
Heavy steel scrap, Phila...	29.00	30.00	30.00	23.50
Heavy steel scrap, Ch'go.	29.50	29.50	30.00	24.00
No. 1 cast, Pittsburgh...	30.00	30.00	30.00	20.00
No. 1 cast, Philadelphia...	30.00	30.00	30.00	21.00
No. 1 cast, Ch'go (net ton).	26.75	26.75	26.00	16.50
No. 1 R.R. wrot, Phila...	35.00	35.00	35.00	30.00
No. 1 R.R. wrot, Ch'go (net)	30.75	30.75	31.25	26.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt....	\$6.00	\$6.00	\$6.00	\$9.50
Furnace coke, future....	6.00	6.00	6.00	7.00
Foundry coke, prompt....	7.00	7.00	7.00	11.00
Foundry coke, future	7.00	7.00	7.00	7.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	23.50	23.50	23.50	36.00
Electrolytic copper, N. Y.	23.50	23.50	23.50	36.00
Spelter, St. Louis	7.50	7.625	7.75	10.50
Spelter, New York	7.75	7.875	8.00	10.75
Lead, St. Louis	7.10	7.10	6.85	9.50
Lead, New York	7.25	7.25	7.00	9.50
Tin, New York	\$5.00	\$5.00	\$5.00	\$3.50
Antimony (Asiatic), N. Y.	13.25	13.50	13.75	31.00
Tin plate, 100-lb. box, P'gh	\$7.75	\$7.75	\$7.75	\$8.00

next week the importance of having prices on iron and steel products adopted for the remainder of the year. It is known that the heads of half a dozen of the large steel companies do not look with favor on any revision in present prices, either higher or lower, pointing out that any changes made ought to involve the entire line of products, and to do this would greatly unsettle conditions in the steel trade. The committee will present evidence to the War Industries Board of the great increase in costs in the last three months, and while this was largely due to the railroad congestion and inability to get fuel, the fact remains that the railroad congestion is not removed by any means and is not likely to be for some months.

It is pointed out that the steel business has given the Government the strongest support possible in every way, often furnishing steel for Government uses in various forms faster than it could be taken care of. This is the situation in nearly all lines, but more especially in plates. The developments at Washington in the next 10 days will be awaited by the steel trade and consumers with the very greatest interest.

In the meantime conditions in the general steel market are very quiet, and were it not for the heavy Government buying it is doubtful if any steel mills could operate to more than a 50 per cent basis. New buying of iron and steel products for ordinary consumption has been remarkably light for the past three or four months. The wire business is referred to at present as being of such light volume that some competition in prices may be expected before long among the mills. This condition may also arise in some other of the lighter steel lines, which have been particularly dull. Operating conditions are still getting better, but the supply of cars is far too short to handle promptly the steel tonnage awaiting shipment by the mills. Enormous stocks of all kinds of finished steel are still piled up in mill

warehouses awaiting cars and it will be some time before these have moved out. The general trade is placing orders only for such quantities of steel as it must have to meet its needs. There is no incentive to buy ahead, and in fact there is no desire on the part of the mills to sell their products for future delivery while the price situation is so uncertain.

Pig Iron.—A representative meeting of the pig-iron interests will be held in New York on Friday of this week to consider the present situation as regards prices of pig iron and also the probable action to be taken by the War Industries Board after its conference with the Committee on Steel and Steel Products in Washington, March 20. At the general meeting of manufacturers, held in New York March 1, Eastern blast furnace companies made a strong plea for higher prices on pig iron, citing conditions in their various localities that do not exist in Western pig-iron centers, and which they consider entitle them to higher prices. The original intention of these concerns was to present their case in Washington separately, but it has now been decided to present it through the general committee. It is claimed that some Eastern furnaces have been making pig iron at a loss for two or three months, due to the heavy increase in their costs on account of the railroad congestion, their repeated bankings, and the excessively cold weather, which kept the output down to a 50 per cent basis or less. It is not believed the general committee will recommend at Washington next week any increase in pig-iron prices, their view being that an advance in pig iron would necessitate a general revision in prices. It has been pointed out by some of the larger producers that any blast furnaces not able to make a profit on present pig-iron prices should very promptly go out of blast, and allow the coke and other fuel going to these furnaces to be diverted to stacks more modern and favorably located,

and that are satisfied with present prices. There is an insistent demand for Bessemer and basic iron, but none is to be had. One leading steel company that has some war contracts has combed the pig-iron market thoroughly, trying to find Bessemer or basic iron, and now plans to take its case to Washington in an attempt to have pig iron commandeered and given to it, so that it can make better progress in filling its war contracts. Nearly all of the pig iron to be made from now through third quarter is under contract, and some makers have sold freely over the second half of the year, prices to be those fixed by the Government at the time shipments are made; or, if no Government prices are in effect at that time, then current pig-iron prices shall apply on these contracts. The output of pig iron in March will certainly show a considerable increase over February. The Carnegie Steel Co. is operating 42 out of 59 blast furnaces, its best record for some months. The National Tube Co. is operating nine of its 11 furnaces, and expects to start its two idle Lorain stacks if plans now under way for getting coke are carried out. Many other stacks have been started, and in the Youngstown district only four furnaces are now idle. Consumers are urging shipments, showing that the pig iron is being melted as fast as received.

We quote as follows: Basic pig iron, \$33; Bessemer, \$36.30; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable Bessemer, \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—There is an insistent demand for billets and sheet bars, and none to be had. The output of steel is steadily increasing, due to larger production of pig iron, but is still too short to supply consumers promptly. Inquiries for steel come to the Pittsburgh district from nearly every place that steel is used, but without result. Prices are apparently not important to some consumers at distant points who would very readily pay the heavy freight charges on steel from this district if they could get it. The scarcity in sheet bars is keeping down output of sheets and tin plate to some extent, and some tin mills are operating with only a day or two supply of steel on hand. It is claimed that a large quantity of steel is going into the manufacture of plates that should be diverted to tin plate and other products, the claim being that at present there is a very heavy overproduction of plates. The trade here believes the War Industries Board will reaffirm present prices on billets and sheet bars, in spite of the fact that several large producers argued recently for an increase in prices of steel, claiming they were too low.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, sheet bars \$51, forging ingots \$73, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Steel Rails.—There is still an insistent demand for light rails from the coal and lumber interests, and mills rolling rails from billets, and also the rerolling rail mills, are sold up for some months, and cannot promise delivery on new contracts inside of three or four months. The Carnegie Steel Co. has not taken an order for standard sections or light rails for 1919 delivery, but its obligations are so heavy that it will carry over to next year a considerable quantity of rails that were originally scheduled for this year's delivery. It is said the Government is figuring on a large quantity of light rails for shipment to France, but the definite inquiry has not yet reached local mills. The Government prices on light rails rolled from billets is \$3 per 100 lb. for 25 to 45-lb. sections. The Government did not establish prices on standard sections.

Ferroalloys.—The demand for all kinds of alloys is active. Prices are very firm and on 50 per cent ferrosilicon are higher. Some sales of 80 per cent domestic ferromanganese have been made lately for last half of the year delivery at \$250 per gross ton, delivered. A Western steel interest has an inquiry out for 400 tons of 50 per cent ferrosilicon, but may have trouble in getting this quantity. There is a decided scarcity in the supply of 50 per cent ferrosilicon, and several smaller orders placed six weeks or two months ago have not yet been shipped. There is also a scarcity in supply of spiegeleisen and prices are very strong

and higher. We now quote 80 per cent domestic ferromanganese very firm at \$250, delivered; 50 per cent ferrosilicon at \$175 to \$180, at furnace, and 18 to 22 per cent spiegeleisen at \$65 to \$70, delivered. Nothing is being done in the way of new sales of Bessemer ferrosilicon or silvery iron, two makers not desiring to sell ahead, until it is known whether there will be any revision in prices on March 31.

We now quote 9 per cent Bessemer ferrosilicon at \$54, 10 per cent \$55, 11 per cent \$58.30, 12 per cent \$61.60. We quote 6 per cent silvery iron \$40, 7 per cent \$42, 8 per cent \$44.50, 9 per cent \$47, 10 per cent \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—Local fabricators report practically an entire absence of new inquiry for general work, nearly all the new work being given out coming from the Government, but details of this are not obtainable. It is stated that the American Bridge Co. and the Fort Pitt Bridge Works combined have taken about 20 buildings for the ordnance base depot in France, calling for about 15,000 tons. The McClintic-Marshall Co. has taken 235 tons for extensions to buildings for the Standard Car Construction Co. at Sharon, Pa. Deliveries of plain material by the mills, to be used in Government work, are reported to be very satisfactory. We quote beams and channels up to 15 in. at 3c. at mill, Pittsburgh.

Plates.—At the meeting of steel manufacturers held in New York on March 1, some very strong arguments were made by Eastern plate mills for an advance in prices. It is said that two mills reported their cost on plates to be 3.75c. or higher, and that unless the price was advanced they would have to retire from the market. To these arguments the answer was made that the larger makers of steel plates were fully satisfied with the 3.25c. price, and that if this was below cost of certain mills these mills should stop making plates and divert the steel to the manufacture of other products, such as tin plate, tubular goods or other materials badly needed by the Government. The statement was also made at this meeting that there was an actual overproduction of plates at present, some putting this as high as 100,000 tons per month, and that there was no necessity whatever for an advance in the price. The great increase recently in the capacity for making plates and the fact that other large plate mills will soon be ready, notably at Youngstown, were forcibly pointed out, so that the mills asking that an advance be recommended in plates did not receive much encouragement. If the reported Government project of ordering the construction of 150,000 cars and 2500 locomotives should be carried out, it is said that 1,500,000 tons of plates and other shapes will be needed. The erection of powder plants in various places will take upward of 200,000 tons, so that, while consumption of plates promises to be very heavy for a long time to come, it would seem that capacity has gotten ahead of consumption, and there may be a scramble for plate orders in the near future. The Carnegie Steel Co. will furnish 10,000 tons of steel plates and shapes to the Toledo Shipbuilding Co., to be used in the building of ore boats. The new inquiry for plates from ship yards all over the country is very heavy. Nothing is being done in new orders for steel cars, and this largely explains the present overproduction of plates. We quote ¼-in. and heavier sheared plates at 3.25c. at mill.

Tin Plate.—Recent rulings from Washington are to the effect that Government licenses for export shipments of tin plate will be granted only for shipments to South and Central America and China and Japan. The tin plate must be intended for food containers for the people of countries at war with the Central Powers or for the promotion of war by the Allies. It is expected that before long the supply of cars for tin-plate shipments will be materially better. The Government now has details of the quantity of tin plate already made and to be made during March, with its destination, and it is believed this will result in priority orders for cars to be furnished the tin-plate mills. Output of tin plate is running from 90 to 95 per cent of capacity,

but there is still a shortage of cars and very heavy stocks are piled up in mill warehouses, which are not likely to be entirely moved out for considerable time. The demand for stock items for tin plate is very active. We quote tin plate at \$7.75 per base box rolled from Bessemer or open-hearth steel. Prices on terne plate are given on page 713.

Hot-Rolled Strip Steel.—The demand is reported quiet, and it is said none of the makers of hot-rolled strip steel is operating to more than about 50 per cent of capacity, due to the dull demand and shortage in steel. The Government price on hot-rolled strip steel is \$4.50 per 100 lb. f.o.b. Pittsburgh, but it is said this price is being shaded on any desirable orders.

Cold-Rolled Strip Steel.—The demand from the general trade is quiet and has been for some months, but the Government is buying fairly large quantities on direct and indirect orders. There is not enough new business to give the cold-rolled strip mills full work and some are operating to only about 50 per cent of capacity or less.

We quote cold-rolled strip steel at \$6.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent cash in 10 days, when sold in quantities of 300 lb. or more.

Sheets.—Fairly heavy demands are being made on the sheet mills by the Government, many of the purchases recently being for use in building hangars and other structures in France. The output of sheets is showing a slow increase, one large interest reporting that last week it operated at 62 per cent of capacity, but this week is on at a decreased rate. The average operation of sheet mills at present is probably 60 per cent, some mills running at a higher rate, and others less. Sheet mills have pretty well worked off their high-priced contracts, and nearly all business now on their books is at the regular Government prices approved by President Wilson on Nov. 5, 1917. When the last bi-monthly wage settlement was made with the sheet mill hands, it was based on 5.15c. as the average price of No. 28 gage black sheets shipped in November and December. Next week the bi-monthly settlement on the sheet scale will be made, and it is possible the average price on shipments for January and February may be slightly less than for the two preceding months. In this event wages of sheet mill hands would have to suffer a slight reduction. Nearly all the mills are sold up to July, and specifications are fairly active. Nothing is known as to what will be done with prices on sheets at Washington next week. The feeling is that present prices should remain, and that they should be made effective over the remainder of this year. There is still a scarcity of sheet bars, and this is keeping down output of sheets to some extent. Heavy stocks are still piled in mill warehouses, but these are moving out as the supply of cars becomes better. Prices on sheets, effective until March 31, are given on page 713.

Iron and Steel Bars.—Mills report the demand from the general trade as quiet, but there has been some buying lately by a few of the implement makers and wagon builders. The leading mills are sold up on iron and steel bars to July or longer, and several of the largest mills through third quarter. Specifications are only fairly active. The demand for reinforcing bars is reported dull, on account of the very quiet condition in building operations everywhere. We quote steel bars rolled from old steel rails at 3c., from steel billets, 2.90c., and refined iron bars, 3.50c., in carloads, f.o.b. Pittsburgh.

Wire Products.—Some heavy inquiries have come out from the Government for wire nails, and are now being figured on by the mills. The Navy Department has an inquiry out for 40,000 kegs, while the Army, through the General Engineer Department, has an inquiry out for 30,000 kegs for export. It is likely these two contracts will be placed with the mills very shortly, probably half of the total quantity going to the leading maker. The general demand for wire and wire nails is fair, and more active for wire than for wire nails. The trade is at sea as to what action will be taken on prices of wire products which expire on March 31. Some makers believe that if pig iron is reduced a reduc-

tion in prices on wire products and also other finished steel materials may follow, but this is all surmise. Local mills are sold up on wire and wire nails to July 1, and are somewhat indifferent about taking on more obligations until it is known what action will be taken in regard to prices. The Government prices on wire and wire nails in effect until March 31 are given on page 713.

Wire Rods.—There is an urgent demand for small lots of wire rods for prompt shipment, but local mills are not quoting, as they are filled up for three or four months, and in addition they say that soft rods at \$57 and bolt and rivet rods at \$65 are not very attractive from the standpoint of profit. They claim they can put the steel into other products on which the profit is larger. There is some export demand for rods, and shipments of considerable size are going to Canada, to the Orient and South America on old contracts. There is also an active demand for high-carbon rods, on which there is an arbitrary price. Prices on rods are given in detail on page 713.

Nuts and Bolts.—A good deal of new business in nuts and bolts and rivets is still coming from the Government on direct and indirect orders, and probably represents 75 per cent of the present limited output in these products. Shipments are better, but the supply of steel is still short, and is keeping down output. Makers of nuts and bolts insist that if prices should be reduced by the War Industries Board, effective from March 31, there should be a corresponding reduction on prices of steel. Discounts in effect until March 31 are given on page 713.

Rivets.—Nearly all the demand for rivets is coming from the Government on direct and indirect orders. The inquiry from the general trade has been quiet for four or five months, consumers buying only in such quantities as they need from time to time. There is no incentive to buy ahead owing to the uncertainty as to prices. The heavy stocks of rivets piled up during the railroad congestion are moving out slowly, as the car supply is better. We quote structural rivets at \$4.65 and cone-head boiler rivets at \$4.75 per 100 lb. f.o.b. Pittsburgh.

Shafting.—The demand from the general trade is dull, but the Government is a fairly heavy buyer, placing orders almost every day for fairly large lots. It is probable the output of shafting is not over 50 or 60 per cent of capacity, and 75 per cent or more of this reduced output is going to the Government on direct or indirect orders. We quote cold-rolled shafting at 17 per cent off list in carloads, and 12 per cent in less than carload, f.o.b. Pittsburgh.

Spikes.—The demand from the railroads is dull, and the output of spikes is not more than 50 per cent of capacity. Should the Government decide to place large contracts for railroad equipment these would probably include the laying of new tracks, and would create a heavy demand for railroad spikes. Railroads now are buying practically nothing. The demand for small spikes from the coal-mining interests is very heavy, and makers are sold up on small spikes and boat spikes for three or four months.

Standard sizes of railroad spikes, 9/16 x 4 1/2 in. and larger, \$3.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, \$5.25 per 100 lb.; track bolts, \$4.90 base in lots of 200 kegs or more; less than 200 keg lots, \$1 per 100 lb. extra. All f.o.b. Pittsburgh.

Wrought Pipe.—Various projects are being put up to the mills nearly every day that involve very large quantities of line pipe and other tubular products, but to these practically no encouragement is given by the mills as regards delivery, the usual answer being that no large quantities of line pipe could possibly be furnished inside of six months, while several of the larger mills state they could not entertain any such inquiries where delivery is wanted this year. Practically all the lapweld iron and steel pipe that can be turned out in the next six months or more is under contract, but on butt-weld some mills can promise delivery in 10 to 12 weeks from date of order. The output of pipe in March is expected to be heavier than in any one month for a long time, several of the larger mills stating they hope

to turn out this month practically normal output. Discounts on iron and steel pipe, effective until March 31, are given on page 713.

Boiler Tubes.—The output of iron and steel tubes for the remainder of this year is under contract largely to the Government, which is said to be taking 75 to 80 per cent of the entire output of boiler tubes. This is also true of locomotive tubes, several of the larger makers having enough obligations on their books to take all they can turn out from now into the early part of next year. Discounts on iron and steel tubes in effect until March 31 are given on page 713.

Skelp.—There is a very active demand for both pipe and boiler-tube skelp, with practically a famine in the supply, mills being sold up for some months.

We quote grooved skelp at \$2.90; universal skelp, \$3.15, and sheared skelp, \$3.25 base. Special skelp for boiler tubes, etc., is \$3.40 for base sizes and \$3.55 for other sizes, all prices being per 100 lb., f.o.b. Pittsburgh.

Coke.—There is considerable criticism among users of blast furnace coke over the fact that the Government has commandeered a certain quantity of coke from each of 32 different coke plants, to be shipped to two concerns in the East making Government plates, and that have steel works and blast furnaces. It is said this is working an injustice to other concerns that also have urgent Government contracts and that are not able to get enough coke to operate their blast furnaces and steel works to anything like full capacity. The movement of coke from the ovens to blast furnaces is fairly satisfactory, but the trouble is not enough coke is being made. Last week the supply of cars averaged less than 50 per cent, but it seemed to be fully large enough to move all the coke made promptly to the furnaces. On Monday and Tuesday of this week some coke works reported a 100 per cent supply of cars, considerably more than they had coke to load. There is no free coke being made, all the coke shipped going on regular orders. The consumption of coke is much heavier than for several months, due to the blowing in of a large number of blast furnaces in the Pittsburgh, Youngstown and other districts. The *Connellsville Courier* gives the output of coke in the upper and lower Connellsville regions for the week ending March 2 as 285,828 tons, an increase over the previous week of 20,979 tons. We quote blast furnace coke at \$6, 72-hour foundry coke at \$7 and crushed coke from 1-in. size at \$7.30 per net ton at oven.

Old Material.—The local scrap market is practically stagnant as far as new sales are concerned, and the outlook for betterment in this direction is not very bright. The commission question on sales of scrap has not yet been definitely settled, and until this is done dealers are not likely to be very energetic in trying to put sales through. Some consumers are opposed to paying a commission to dealers in the sale of scrap, while others favor it. We have not heard of any sales of moment of old material for some time, and most local dealers say they will simply hold off trying to do business until conditions are more settled.

Prices on iron and steel scrap, nearly all of which have been fixed by the Government, for delivery in Pittsburgh and other points that take Pittsburgh freights are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$30.00
No. 1 foundry cast	30.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh	35.00
Hydraulic compressed sheet scrap	\$26.00 to 27.00
Bundled sheet scrap, slides and ends f.o.b. consumers' mill, Pittsburgh district	24.00 to 25.00
Bundled sheet stamping scrap	22.00 to 23.00
No. 1 railroad malleable stock	30.00
Railroad grate bars	19.00 to 20.00
Low phosphorus melting stock	40.00
Iron car axles	47.50
Steel car axles	47.50
Locomotive axles, steel	47.50
No. 1 busheling scrap	27.00 to 28.00
Machine shop turnings	20.00
Cast iron wheels	30.00
Rolled steel wheels	35.00 to 37.00
*Sheet bar crop ends	39.00 to 40.00
Cast iron borings	20.00
No. 1 railroad wrought scrap	35.00
Heavy steel axle turnings	25.00 to 26.00
Heavy breakable cast scrap	30.00

*Shipping point.

Chicago

CHICAGO, March 11—(By Wire).

Viewed from any angle, the steel industry presents an encouraging aspect. Production is practically normal, while specifications and orders are heavier and more numerous than they have been for months. The leading interest is taking care of its customers' requirements for the last half. It is now operating 24 out of 29 blast furnaces, and its rolling mill operations are practically all that could be desired. With all its losses, its production for this year up to the present time will equal that of the same period last year, owing to increased capacity. The leading independent continues to operate at 85 to 90 per cent of capacity. Government agencies similar to the Submarine Boat Corporation continue to place orders for plates and shapes, the aggregate tonnage of which is enormous. Much of the material is to be fabricated by Middle Western shops. It is expected that negotiations between the United States and Japan will soon result in licenses to ship plates to the Orient. One mill has orders on which shipments to Japan have been deferred amounting to 20,000 to 25,000 tons. Bars of all kinds are in good demand. The call for rail carbon bars is greater than the supply of old rails. Something over 700 tons of mild steel bars is wanted by the Imperial Munitions Board for delivery to a Vancouver shipyard. It is estimated that the sheet mills of the country are operating about 60 per cent, with Government orders for 14,000 to 15,000 tons pending. A scarcity of pig iron seems inevitable.

Pig Iron.—The fact that a scarcity of pig iron is inevitable if it does not already exist is something to which more and more thought is being given by the trade. Northern makers are so nearly sold up for the last half that their chief concern is not in taking orders but in deciding how much they can spare to this or that customer who has been slow in covering last half needs. A seller of Southern iron, in urging foundrymen to cover their requirements for as far ahead as the furnaces will sell, says that the demand of the steel-makers for basic may cause a reduction in the production of foundry grades, and that already pressure has been brought to bear on some of the furnaces to induce them to change over to steel-making iron. The authority in question says, "This possibly will have more direct effect on the Northern furnaces than on the Southern, but anything which reduces the supply in foundry iron in one section of the country throws additional burdens on the production in other sections and increases the problems of the manufacturer of grey iron castings." While many large consumers have not bought what they might be expected to use in the last half, others have covered their requirements and still others are waiting for their orders to be accepted.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$37.50
Lake Superior charcoal, No. 6 and Scotch	40.00
Northern coke foundry, No. 1	33.50
Northern coke foundry, No. 2	33.00
Northern coke foundry, No. 3	32.50
Northern high-phosphorus foundry	33.00
Southern coke No. 1 foundry and No. 1 soft	38.50
Southern coke No. 2 foundry	37.00
Malleable Bessemer	33.50
Basic	33.00
Low phosphorus (copper free)	53.00
Silvery, 7 per cent	44.54

Ferromanganese.—In 80 per cent ferromanganese there is a little activity at \$250 delivered. The makers continue uneasy in respect to the possibility of an adequate ore supply, one cause of which is the withdrawal of vessels from the South American trade and another is the demand of the Brazilian Government that every ship return to Brazil with a cargo of coal. Some of the English makers of ferromanganese have promised to complete unfilled contracts, but against this is argued the uncertainty of transatlantic transportation.

Plates.—Negotiations between the United States and Japan are reported to have progressed to a point which makes it probable that shipments to that country, under license, will soon be resumed. Travelers from Japan

say that country is practically destitute of steel. Should the license to export, under restrictions, be granted, there are thousands of tons of plates on old orders against which shipments have been suspended which must be cared for first. One company has orders for 20,000 to 25,000 tons on which shipments have been deferred. The Submarine Boat Corporation is placing orders for thousands of tons, much of which is to be delivered to local fabricating plants. The mill quotation is 3.25c., Chicago. Jobbers quote 4.45c. for plates out of stock.

Structural Material.—Orders aggregating many thousands of tons have been placed with the two leading interests for plates and shapes to be delivered to fabricators in Illinois, Wisconsin, Indiana and elsewhere to be worked into ship parts for the Submarine Boat Corporation and the Emergency Fleet Corporation. These orders range from 40 tons upward, one single order specifying about 30,000 tons. No large structural propositions are reported, most of the large buildings contemplated being concrete. Car business is awaiting Government action. The Lackawanna Steel Co. will supply 268 tons required by shops for the Lake Superior & Ishpeming Railroad at Marquette, Mich., for which the Arnold Co., Chicago, has the contract. The leading producer is booking some business with the jobbers for the last half. The mill quotation is 3c., Chicago, and that for material out of warehouse, 4.20c.

Bars.—The demand for bars of all kinds is good. Agricultural implement makers and jobbers have been recent buyers, while the Government requirements, especially those coming from vehicle makers who want material for tires, have been noteworthy. The Imperial Munitions Board, Canada, has inquired for about 700 tons of mild steel bars, to be delivered to a Vancouver shipyard for use in the construction of wooden ships. Government warehouses, work on which has been started in the central manufacturing district of Chicago, will require at least 3500 tons of concrete reinforcing bars, on which inquiry has been made. Frank Lord Wright, architect, Chicago, is inquiring for about 1400 tons of hard bars, delivery this year, to be used in constructing the Imperial Hotel, Tokio, Japan. There is more rail carbon bar business than there are rails with which to manufacture, and some mills are turning orders away. Iron bars are active and strong at 3.50c., Chicago. We quote mild steel bars at 2.90c., Chicago, and high carbon bars at 3c., Chicago. Chicago warehouse prices follow:

Soft steel bars, 4.10c.; bar iron, 4.10c.; reinforcing bars, 4.10c., base, with 5c. extra for twisting sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting, list plus 10 per cent.

Rails and Track Supplies.—All railroad buying of rails and supplies awaits Government action. Spikes are easily obtainable. The quotation for iron tie-plates is 3.75c. We quote:

Standard railroad spikes, 4.11½c., Chicago. Track bolts, with square nuts, 5.11½c., Chicago. Tie plates, steel, 3.25c.; tie plates, iron, 3.75c., f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill for 25 to 45-lb. sections, lighter sections taking Government extras.

Wire Products.—The great problem of the markets of wire products is the scarcity of cars needed to ship finished material to jobbers. Production is steadily improving. We quote:

Nails, \$3.50, Pittsburgh; plain fence wire, \$3.25; painted barb wire, \$3.65; galvanized barb wire, \$4.35; polished staples, \$3.65, and galvanized staples, \$4.35.

Sheets.—On the average sheet mills are running about 60 per cent of capacity. Meanwhile between 14,000 and 15,000 tons which are needed for Government purposes are pending. Government business could be much more readily placed were it not for the strict character of the specifications, some of which appear to indicate an excessive degree of caution. Some important mills continue their policy of not selling except where the Government is concerned. We quote No. 10 blue annealed at 4.25c., No. 28 black at 5c. and No. 28 galvanized at 6.25c., all Pittsburgh.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.45c.; No. 28 black, 6.45c., and No. 28 galvanized, 7.70c.

Bolts and Nuts.—Both production and demand continue to expand. For prices and freight rates see

finished iron and steel, f.o.b. Pittsburgh, page 713. Jobbers quote:

Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40 and 10 per cent off; larger sizes, 35 and 5 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 40 and 2½ off; larger sizes, 30 and 5 off; hot pressed nuts, square tapped, \$1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 50 per cent off.

Cast-Iron Pipe.—Niagara, Wis., through a contractor, will place 142 tons, March 14, and at Beresford, S. D., a contractor will place 185 tons to-day. We quote:

Quotations per net ton, Chicago, are as follows: Water pipe, 4-in., \$57.30; 6-in. and larger, \$54.30, with \$1 extra for Class A water pipe and gas pipe.

Old Material.—The market is quiet, with the interest shown by consumers so indifferent that it is wondered whether they later will not have cause to regret their inaction. Furthermore, material is not coming out to the extent it should. Eastern mills seem more ready buyers than those in the West. The advance from \$30 to \$35 for cast-iron scrap for cupola use has caused dissatisfaction for the reason, according to the local trade, that the advance was predicated on conditions which existed in the East and not in the West. It is supposed that the price was advanced because the steel mills were taking cast to the exclusion of the foundries. Brokers are keenly awaiting some action with regard to the 3½ per cent commission which was not incorporated in the later price recommendations. It is understood the question is again to be passed on officially.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$38.00 to \$39.00
Relaying rails.....	60.00
Old carwheels.....	30.00
Old steel rails, rerolling.....	35.00
Old steel rails, less than 3 ft.....	35.00
Heavy melting steel.....	30.00
Frogs, switches and guards, cut apart.....	30.00
Shoveling steel.....	29.50 to 30.00
Steel axle turnings.....	25.00

Per Net Ton	
Iron angles and splice bars.....	\$35.71
Iron arch bars and transoms.....	\$39.00 to 40.00
Steel angle bars.....	30.00 to 31.00
Iron car axles.....	42.41
Steel car axles.....	42.41
No. 1 railroad wrought.....	30.75 to 31.25
No. 2 railroad wrought.....	30.36
Cut forge.....	30.36
Pipes and flues.....	24.50 to 25.00
No. 1 busheling.....	26.50
No. 2 busheling.....	18.25 to 18.75
Steel knuckles and couplers.....	31.25
Coil springs.....	31.25
No. 1 boilers, cut to sheets and rings.....	22.00 to 23.00
Boiler punchings.....	32.00 to 33.00
Locomotive tires, smooth.....	38.50 to 39.50
Machine-shop turnings.....	16.50 to 17.00
Cast borings.....	16.25 to 16.75
No. 1 cast scrap.....	27.25 to 28.25
Stove plate and light cast scrap.....	23.00 to 23.50
Grate bars.....	22.50 to 23.50
Brake shoes.....	25.00 to 26.00
Railroad malleable.....	28.25 to 28.75
Agricultural malleable.....	27.25 to 27.75
Country mixed scrap.....	20.00 to 22.50

Cincinnati

CINCINNATI, March 12—(By Wire).

Pig Iron.—Southern high silicon iron is still in demand and some sales of 500 tons and over were made to nearby melters for last half shipment. Iron that formerly was sold as No. 2 soft is now disposed of strictly on an analysis basis, thereby bringing a comparatively higher price than formerly. Inquiries for foundry iron are not coming out as freely, although buyers are not now predicting any change in the Government base price on Southern iron as was previously rumored. Improvement in the shipping situation continues, and when iron is loaded on cars it is moved by the railroads promptly. The trouble now reported concerns the shortage of cars, which seems to be more acute in the South than elsewhere. An increase in production is reported as being general in all districts, but this increase is not sufficient to cover the needs of either foundry or basic melters, although their immediate wants seem to be fairly well supplied. The efforts of foundrymen to accumulate a stock of iron appear to be without result, but foundry operation on a hand-to-mouth basis, as was general the first of the year, seems now to be a thing of the past. Northern furnaces are now out of the market entirely and it is doubt-

ful whether any Northern iron could be bought for shipment this year except in cases where some special iron produced could be used by consumers. The tonnage of Southern high-sulphur iron that has been offered for first half shipment appears to be diminishing and some strictly No. 2 foundry can now be had for shipment before July 1. Only a few producers are said to be able to fill orders for this grade of iron. Virginia foundry iron has not been a factor in this market for several weeks.

Based on freight rates of \$2.90 from Birmingham and \$1.26 Ironton, we quote f.o.b. Cincinnati, as follows:
 Southern coke, No. 2 foundry and No. 2 soft..\$35.90
 Southern Ohio, No. 2..... 34.26
 Basic, Northern..... 34.26

Finished Material.—Deliveries are being made to jobbers of shipments that have been en route over 30 days, and in some cases 60 days. However, shipments from nearby points are being delivered at a satisfactory rate. In some instances the jobbers have paid for material long before it arrives. This is especially true on shipments from Buffalo, and even from Pittsburgh territory. The railroad situation is now clearing up to some extent, although normal conditions are not expected for some time. Outbound shipments to Kentucky points are moving fairly well, and deliveries are also being made to customers in Ohio as far as Springfield. A considerable improvement is noted in the wire-nail business, as retail merchants are ordering quite freely. The sheet mills are still behind in filling orders, and report specifications on old contracts as coming in at a rapid rate. Competition in the high speed steel line is quite brisk, but some of the leading manufacturers are holding to the Government's price of \$2 per lb. base.

Jobbers' prices are unchanged as follows: Iron and steel bar, 4.08½c.; twisted bars, ¾ x 1¼-in., 4.23½c.; ¾-in., 4.33½c.; ½-in., 4.43½c.; ¾-in., 4.63½c., and ¼-in., 4.88½c. Structural shapes are quoted at 4.18½c.; plates, ¼-in. and heavier, 4.43½c.; No. 10 blue annealed sheets, 5.43½c. Cold rolled shafting is sold at 10 per cent discount. The mill price on No. 28 black sheets is 5.18½c., and No. 28 galvanized 6.43½c. Wire nails, \$4.10 per keg, base.

Coke.—The improvement in shipments is not up to expectations. The shortage of cars is causing inconvenience, although after the fuel is loaded there is now comparatively little delay in moving it to destination. The labor situation continues serious, with probably more trouble reported in the Connellsville field than elsewhere. However, there is a big improvement in the labor supply as compared with two months ago. The quality of coke made is also much better than at that time. No new business is being transacted with the exception of an occasional car of foundry coke that can be shipped an old customer. The new price of Pocahontas coke is now \$8 per net ton at oven, and this same figure is made on either 48-hr. or 72-hr. coke, but no sales are reported at the new price by any of the local offices.

Old Material.—Some difficulty is yet experienced in moving shipments to Pittsburgh, the largest consuming center, although it was thought that all embargoes would be raised this week. Prices are unchanged, but borings and turnings are in a little better demand and are probably firmer than at any time since the new Government schedule was brought out. The maximum prices have not yet been established, and the general tendency is to quote Pittsburgh prices less \$2.50 per gross ton freight. The following are dealers' prices, f.o.b. southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.....	\$19.00
Old iron rails.....	\$32.00 to 32.50
Relaying rails, 50 lb. and up.....	44.00 to 44.50
Rerolling steel rails.....	33.00 to 33.50
Heavy melting steel scrap.....	27.00
Steel rails for melting.....	27.00 to 27.50
Old carwheels.....	28.00
Per Net Ton	
No. 1 railroad wrought.....	\$29.00 to \$29.50
Cast borings.....	14.50 to 15.00
Steel turnings.....	14.50 to 15.00
Railroad cast.....	25.00 to 25.50
No. 1 machinery.....	25.00 to 25.50
Burnt scrap.....	16.50 to 17.00
Iron axles.....	40.00 to 40.50
Locomotive tires (smooth inside).....	33.50 to 34.00
Pipes and flues.....	19.00 to 19.50
Malleable cast.....	24.00 to 24.50
Railroad tank and sheet.....	17.00 to 17.50

Birmingham

BIRMINGHAM, ALA., March 12.

Pig Iron.—Southern pig iron being offered is finding ready buyers. There is demand for all that is to be had. Some of the furnace companies are not in the market for the fourth quarter to the fullest extent and care is being exercised by sellers with some interest being shown in the possibilities of the Government revision the end of the month. The make of iron in Alabama is picking up. It was disappointing in February. Coke, of which there has been a shortage by reason of labor troubles in the mining fields, is a little more plentiful, but still not up to all requirements. A good start toward a large production has been made already in March. The Rome, Ga., furnace is down because of a coke shortage. Delay in starting up of the Trussville furnace, near Birmingham, has been caused by the inability to get coke and the company was forced to open mines and is building a washer to clean the coal for coking.

Cast-Iron Pipe.—Some few specifications for cast-iron pipe are to be heard of but there is little improvement.

Coal and Coke.—Coal and coke production is improving again. More coal is being mined in Alabama now than for many a day, but the shortage is still being complained of. Warm weather has brought about no let-up in the demands. Railroads are doing well in furnishing cars with which to move coal. Government control is still sharp. Discontent on the part of employees of some of the larger corporations in this district, especially with the Tennessee Coal, Iron & Railroad Co., and the Republic Iron & Steel Co., is disappearing and the men are working a little more steady, following investigations by representatives of the Fuel Administrator.

Scrap Iron and Steel.—Old material dealers declare their market now is a waiting one, consumers apparently waiting to see what the Government is going to do in the matter of revision on pig iron. Some inquiries are being received as to scrap iron and steel, but contracts are not being made, pending some effect following the iron situation the end of the month. Consumers of old material in the South are purchasing lightly and are not coming much closer to the quotations than about \$1 per ton under the list. The quotations show no change, being as follows:

Old steel axles.....	\$32.00 to \$33.00
Old steel rails.....	28.00 to 30.00
Heavy melting steel.....	25.00 to 27.00
No. 1 R. R. wrought.....	27.00 to 30.00
No. 1 cast.....	25.00 to 26.00
Old carwheels.....	25.00 to 30.00
Tramcar wheels.....	21.00 to 25.00
Machine shop turnings.....	17.50 to 19.00
Cast iron borings.....	13.00 to 15.00
Stove plate.....	19.00 to 21.00

St. Louis

ST. LOUIS, March 11.

Pig Iron.—The buying of pig iron continues to be governed by the possibilities of obtaining the material, and any offerings that are made by representatives of the furnaces are immediately snapped up by consumers, who are ready to take almost anything within reasonable reach of the analysis they have been accustomed to using. Sales during the week aggregated several thousand tons of all grades and analyses, considerable for immediate delivery and much for last half.

Coke.—Coke is wanted on contracts, but deliveries continue to be difficult because of the car situation and the status of the ovens as regards production and loading. While there is no shutting down of plants, there is a status of running close to the wind that is not appreciated favorably by the melters. No new transactions are taking place either in beehive oven or by-product coke, there being none on the market or obtainable for present or future delivery.

Finished Iron and Steel.—In finished products the attention of the market is chiefly directed to getting deliveries of material already contracted for, and the

representatives of the mills are not considering any proposals for orders. The warehouses are continuously crowded with orders for materials and are delivering up to their capacity. For stock out of warehouse we quote as follows: Soft steel bars, 4.17c.; iron bars, 4.17c.; structural material, 4.27c.; tank plates, 4.52c.; No. 8 sheets, 5.47c.; No. 10 blue annealed sheets, 5.52c.; No. 28 black sheets, cold rolled, one pass, 6.52c.; No. 28 galvanized sheets, black sheet gage, 7.77c.

Old Material.—The dealers are optimistic as to future business and are anticipating that prices will generally reach the Government basis. Most products now are up to the Government level, and while there is still some opportunity to operate in scrap, the margin is getting smaller and thereby necessitating the commission method. Railroad lists include Wabash, 1200 tons; Missouri, Kansas & Texas, 1000 tons. Cast iron and steel are in special demand, but there is no supply. Rolling mills are not actively in the market. Foundry grades are advancing, the accusation being made that some dealers are paying and some producers accepting prices above Government figures. An investigation and action are regarded as possible.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$36.00 to \$36.50
Old steel rails, rerolling.....	34.50 to 35.00
Old steel rails, less than 3 ft.....	37.50 to 38.50
Relaying rails, standard sections, subject to inspection.....	60.00 to 75.00
Old carwheels.....	29.50 to 30.00
No. 1 railroad heavy melting steel scrap.....	29.50 to 30.00
Heavy shoveling steel.....	28.50 to 29.00
Ordinary shoveling steel.....	28.00 to 28.50
Frogs, switches and guards cut apart.....	29.50 to 30.00
Ordinary bundled sheet scrap.....	24.00 to 24.50
Heavy axle and tire turnings.....	21.50 to 22.00

Per Net Ton	
Iron angle bars.....	\$35.50 to \$36.00
Steel angle bars.....	30.00 to 30.50
Iron car axles.....	42.00 to 42.50
Steel car axles.....	41.00 to 41.50
Wrought arch bars and transoms.....	41.50 to 42.50
No. 1 railroad wrought.....	30.25 to 30.75
No. 2 railroad wrought.....	29.25 to 29.75
Railroad springs.....	30.00 to 30.50
Steel couplers and knuckles.....	30.75 to 31.25
Locomotive tires, 42 in. and over smooth inside.....	37.00 to 37.50
No. 1 dealers' forge.....	26.50 to 27.00
Cast iron borings.....	17.00 to 17.50
No. 1 busheling.....	26.25 to 26.75
No. 1 boilers, cut to sheets and rings.....	23.00 to 23.50
No. 1 railroad cast scrap.....	26.50 to 27.00
Stove plate and light cast scrap.....	21.00 to 21.50
Railroad malleable.....	26.50 to 27.00
Agricultural malleable.....	24.50 to 25.00
Pipes and flues.....	25.00 to 25.50
Heavy railroad sheet and tank scrap.....	22.50 to 23.00
Railroad grate bars.....	20.50 to 21.00
Machine shop turnings.....	17.50 to 17.75
Country mixed scrap.....	21.50 to 22.00
Uncut railroad mixed scrap.....	24.00 to 24.50

Philadelphia

PHILADELPHIA, March 12.

Coal conditions show a little improvement over a week ago, and steel plants are able to operate a greater percentage of open-hearth furnaces. The distribution of coal to steel industries and metal-working plants doing war work is now being handled by Bernard M. Baruch, chairman of the War Industries Board, to the extent that he designates which companies shall have preference in shipments, indicating also priorities as between Government departments. Under this arrangement it is believed that a better supply of coal will be forthcoming to certain eastern plants. Satisfactory improvement in receipts of coke by blast furnaces is not being made, however, and the situation is growing more critical for blast furnace operators from the standpoint of mounting costs. In some instances receipts of coke are not better than during the worst of the winter weather in February. The price situation is absorbing the attention of the iron and steel trade here, and a variety of opinions as to the outcome of the negotiations with the War Industries Board on March 20 is heard. There is talk of both lower and higher prices on pig iron and a higher price on plates, at least for the smaller producers of the latter, but the prevailing opinion is that the present price schedule will be reaffirmed for the remainder of the year without any changes.

Pig Iron.—A committee of three members of the Eastern Pig Iron Association will meet in New York on Thursday or Friday of this week with a larger committee of the American Pig Iron Association, the latter representing all of the iron producing districts, for the purpose of formulating recommendations to the Committee on Steel and Steel Products of the American Iron and Steel Institute relative to prices for pig iron after March 31. There is undoubtedly a strong sentiment among merchant pig iron producers in favor of the reaffirmation of present prices, but a number of factors confuse the situation, and an effort will be made by the pig iron men to reach an agreement among themselves and take concerted action. Consumers of iron, including some of the large steel companies, are represented as having suggested a lower price. At least two companies are said to have made the suggestion to the War Industries Board that Southern producers are making a very large profit and should be obliged to sell their output on a lower basis at furnace than Eastern and Northern irons, owing to lower operating costs. This, of course, is opposed by the Southern interests, which maintain that they should have the benefit of their location. The steel makers, though not buyers of merchant iron in normal times, are now anxious to make up deficiencies in their own production by purchasing steel-making iron from merchant furnaces, and some furnaces might be able to take such orders if they were able to operate at maximum capacity. Hence the suggestion is said to have emanated from the operators of large modern furnaces that they be permitted to receive a full supply of coke and that the smaller and less efficient furnaces take what is left. As it is becoming apparent that the supply of coke is not going to be sufficient for all to receive 100 per cent of their requirements, it follows that a number of furnaces, particularly the smaller plants whose output is largely foundry grades, would be forced to shut down and many foundries would likewise be put out of business for lack of iron. This situation would particularly affect the members of the Eastern Pig Iron Association, and the committee which goes to New York will present its views to the committee of the American Pig Iron Association and attempt to reach an understanding. There is known to be a feeling among officials in Washington that some prices ought to be reduced. The discussion just at present seems to have centered upon pig iron, and it would not be surprising if iron prices would be the pivotal point in the discussions in Washington. The Eastern Pig Iron Association and individual members will present cost sheets showing that average costs of making merchant iron in this district have risen recently to \$28 to \$30 a ton, and that any reduction in price would force some of the furnaces to quit as soon as their present stocks of raw material are used up. If a readjustment of pig iron prices seems inevitable, the Eastern Pig Iron Association will ask that it be done by districts, in which event the producers in this section would feel entitled to a higher price than those in the South and in the Valleys. The War Industries Board has been kept informed of pig iron costs, but the reasons for the difference in the cost to a self-contained steel plant for hot metal and in the cost of pig iron made by merchant furnaces, it is pointed out, seem not to be clearly understood. A few furnaces continue to sell foundry iron for second half at a very fair rate, all contracts having a cancellation clause which permits the seller to abrogate the contract in case the price is lowered to a point below the cost of production. An interesting transaction of the week was the purchase by the American Bridge Co., Pencoyd plant, of about 35,000 tons of standard Bessemer iron, which had been lying for months at Eastern ports awaiting shipment to the French Government. As shipping space is lacking, it was decided to take the iron over for use in this country. The total amount in storage was about 55,000 tons, but about 20,000 tons of this was bought at prices higher than the \$36.30 fixed price, and as it could not be sold without a loss it will probably be shipped eventually to France. The iron will be used in basic open-hearth furnaces, and the fact that the American Bridge Co. was willing to pay \$3.30 per ton above the price of basic iron shows the extreme need of pig iron

at the present time. A portion of this iron may go to the Worcester, Mass., works of the American Steel & Wire Co. The Penn Seaboard Steel Corporation, Philadelphia, closed for 12,000 tons of basic iron for second half delivery. Most of this iron will go to the New Castle, Del., plant, which will have its new plate mill in readiness in the latter half of the year. Government distribution of pig iron is becoming a factor with which consumers will now have to reckon. The Director of Steel Supply in Washington is in many instances issuing orders to furnaces as to where and how much to ship. Frequently such orders result in diverting iron from other consumers which have Government work, and then subsequent orders are issued to take care of those complaining. The effect of this direction of shipments will ultimately be to give priority to the most essential work and put aside the less essential manufacturers, regardless of the contract schedule of deliveries, until many of the least essential are weeded out entirely. As there is not going to be sufficient iron to go around, it is apparent that many consumers, not able to persuade the Government of the prime essential character of their work, will be obliged to go without iron. We quote standard grades of iron f.o.b. furnace, with the exception of Virginia iron, for which the delivered price is quoted:

Eastern Pennsylvania No. 1 X.....	\$34.50
Eastern Pennsylvania No. 2 X.....	33.50
Eastern Pennsylvania No. 2 foundry.....	33.00
Virginia No. 2 X (including freight).....	36.77
Virginia No. 2 foundry (including freight).....	36.27
Basic.....	33.00
Gray forge.....	32.00
Bessemer.....	36.30
Standard low phosphorus.....	53.00
Low phosphorus (copper bearing).....	50.00

Railroad Equipment.—The subject of fixed prices on axles, wheels and tires will be discussed this week at a meeting in New York of the Committee on Steel and Steel Products of the American Iron and Steel Institute. This is believed to be a preliminary of the letting of Government orders for railroad equipment, including at first 50,000 to 60,000 freight cars and 2500 locomotives. Standard designs for freight cars have been approved by the conference of car builders and railroad representatives and are now before the Railroad Administration. These include a 70-ton hopper car, a 55-ton gondola car and two types of box cars, 40 and 50 tons. These orders may be distributed within the next two weeks if an agreement is quickly reached on prices for axles, wheels and tires.

Coke.—Receipts of coke by foundries are perhaps slightly better. At any rate, less complaint is heard. Blast furnaces, however, report very little improvement, owing to commandeering by the Government, and production of pig iron is not showing the improvement that had been expected. Furnaces in Virginia are now forced to pay as high as \$8 a ton for coke under the new varied-price schedule of the Fuel Administration.

Ferroalloys.—The ferromanganese market is reported to be firm at \$250 per ton for the 80 per cent delivered, but a sale of 600 tons to a Cleveland company was made at \$240, delivered, and sellers here are at a loss for an explanation of this low price except that the sale involved a reciprocal deal of some kind. A Newport, Ky., consumer which was in the market for 400 tons is trying to buy at \$245, but no seller in this district was willing to consider that price. Spiegeleisen is also quoted stronger, and spot lots are not so easily obtained, as several furnaces which ordinarily produce spiegeleisen are working on ferromanganese or pig iron. Sales this week have been on the basis of \$62 to \$64, at furnace, for the 20 per cent. A sale was made by a local company of 150 tons of silica spiegel, analyzing 50 per cent manganese and 15 to 20 per cent silicon, at \$3 per unit for each element, making the price per ton about \$195, at furnace.

Plates.—The Government has given out additional large orders during the past week, principally for plates, but shell steel has also figured largely in the specifications. A large eastern Pennsylvania steel company reports that Government orders have been

as heavy as if plants had been working at full capacity, with the result that nearly all steel makers are carrying an overload of urgent orders and are making every effort, against many handicaps, to meet the Government requirements. Nothing definite is heard here as to the probable new price for plates, but some of the smaller producers persist in the belief that the War Industries Board will grant a higher price, or at least will permit a graduated price schedule which will take into account the various classes of mills. All suggestions as to the future price are admittedly guesswork, but there is considerable interest in a plant reported to have been given consideration, that the price remain stationary so far as it applies to all self-contained steel plants, but that a differential be granted above this price to rolling mills which produce their own pig iron, another rise above that to mills which buy merchant pig iron, and still another rise to mills which buy semi-finished material for rerolling. The Donner Steel Co., Buffalo, is offering tank quality plates in this market in limited tonnages, but its specification plates are reserved for Government use. Other plate makers report that they are turning down all inquiries. New plate production will become a factor in this market within the next few months. The Brier Hill Steel Co., Youngstown, Ohio, will probably come into the market soon for second-half orders. The Penn Seaboard Steel Corporation, Philadelphia, expects to have its new plate mill at New Castle, Del., ready in the latter half of the year, and the same is true of the Worth Steel Co., Claymont, Del. The Lukens Steel Co., Coatesville, Pa., will soon have its new plate mill ready for operation, but its starting may be delayed by the insufficiency of coal. We quote plates, universal or tank quality, $\frac{1}{4}$ in. or heavier, at 3.25c. base, Pittsburgh.

Structural Material.—There is very little new activity in the structural steel market. The Signal Corps has awarded to the Belmont Iron Works, Philadelphia, an order for 20 portable hangars for shipment to France. We quote plain material at 3c., base, Pittsburgh.

Iron and Steel Bars.—The Donner Steel Co., Buffalo, is taking orders for soft-steel bars for delivery in three or four months, at which time its new 14-in. bar mill is expected to be in operation. Other small lots of steel bars have been sold. Bar-iron business is quiet. Certain bar-iron mills are suffering from a shortage of scrap, while others, more favorably located for deliveries, are amply taken care of. We quote soft-steel bars at 2.90c., Pittsburgh, and bar iron at 3.685c., Philadelphia.

Sheets.—A small business in sheets is being done in this market. We quote No. 10 blue annealed at 4.25c., No. 28 black at 5c., and No. 28 galvanized at 6.25c.

Billets.—There is no selling of billets. We quote open-hearth rerolling billets at \$50.50, Philadelphia.

Old Material.—Complications are resulting from the recently adopted differentials on iron and steel scrap. The matter of commission to dealers and brokers, for one thing, has not been settled, and the trade is not anxious to do business until it is determined whether the commission is to be allowed. This will probably be definitely decided at a meeting of the Committee on Steel and Steel Products of the American Iron and Steel Institute in New York on Friday of this week. Another disturbing factor is the complaint of steel plants that the higher prices which foundries and rolling mills are now permitted to pay will cause a shortage of scrap for steel making. Such a shortage is now beginning to be felt in the Pittsburgh district. Still another complication is the manner in which certain mills are unintentionally discriminated against because of their unfavorable locations. Two Eastern rolling mills and a plant at Cumberland, Md., are now shut down for lack of scrap, although all of them are reported to have plenty of material bought. It is not being shipped to them, and they find it almost impossible to meet their requirements in the market because of the fact that other mills, located closer to distributing points, and having lower freight rates, absorb practically all the

material that is offered and leave none for them. These plants would be able to obtain scrap if they could pay a higher price, which they could always do in normal times, but the Government price regulations do not permit this; hence they go without. The Subcommittee on Iron and Steel Scrap, W. Vernon Phillips, Philadelphia, chairman, is now trying to work out a solution of this problem, so that badly located plants will not be thus discriminated against. A weakness in all grades of scrap has developed in this district, but with the exception of heavy melting steel, and No. 1 cast for foundries, prices are not quotably lower. A large eastern Pennsylvania consumer of melting steel no longer will pay the maximum, and has offered as low as \$28, delivered, but dealers are not willing to sell below \$30. However, some small tonnages in transit have been sold at \$29, and we lower our quotation this week to that figure. Foundries will not pay the maximum of \$35 for No. 1 cast, and sales have been made at \$32 to \$33. Some dealers predict that there will be a better movement of scrap to the Pittsburgh district as a result of the weakness here, while others believe that there will be a tendency to sit tight and wait until eastern Pennsylvania consumers again come into the market. The Pennsylvania Railroad list for March is reported to have been sold at the maximum prices on every item. We quote as follows for delivery to consuming point in the eastern Pennsylvania district:

No. 1 heavy melting steel.....	\$29.00 to \$30.00
Steel rails, rerolling	35.00
Low phosphorus heavy, 0.04 and under.....	\$37.50 to 40.00
Low phosphorus (not guaranteed).....	35.00
Old iron rails.....	40.00
Old carwheels.....	30.00
No. 1 railroad wrought	35.00
No. 1 yard wrought.....	34.00
Country yard wrought	30.00
No. 1 forge fire	27.50 to 28.50
Bundled sheets	27.50 to 28.50
No. 1 busheling	32.00
No. 2 busheling	17.00 to 18.00
Turnings (for blast furnace use).....	17.50 to 18.50
Machine shop turnings (for rolling mill use)	18.50 to 19.50
Cast borings (for blast furnace use).....	17.50 to 18.00
Cast borings (clean).....	20.00
No. 1 cast (for steel plant use).....	30.00
No. 1 cast (cupola sizes).....	32.00 to 33.00
Grate bars	23.00 to 24.00
Stove plate	23.00 to 24.00
Railroad malleable (for steel plants).....	29.00 to 30.00
*Railroad malleable (for malleable works).....	35.00
Wrought iron and soft steel pipes and tubes (new specifications).....	24.00
Ungraded pipe	30.00

*Maximum price obtainable.

Cleveland

CLEVELAND, March 12—(By Wire).

Pig Iron.—Inquiries for foundry iron in lots of 500 tons and less for the last half continue to come out in fairly large volume and, although many consumers in this territory have not covered for that delivery, only one Cleveland seller has any to offer and that only in limited amounts to its regular trade. Improved furnace operations have given a Cleveland producer a little surplus basic iron and 4000 tons has been sold to a northern Ohio steel plant for prompt shipment, with former basic inquiries still unsatisfied. Two new basic inquiries have developed, one from central Ohio for 10,000 tons and the other from southern Ohio for 20,000 tons for the last half. There is considerable demand for Southern iron around 3 per cent in silicon, as the tendency of northern furnaces is to increase their output by making little silicon iron. As a result high silicon Southern iron has become scarce. The proposal of some steel plants that have been unable to secure basic iron that the Government change some of the merchant furnaces from foundry iron to basic is meeting with strong objections from foundrymen and furnace operators. Some producers say that the shortage of foundry and malleable iron in proportion to the melt is greater than that of steel-making iron. Foundries are having a great deal of trouble now in securing iron to fill Government orders and a canvass of the situation by the American Foundrymen's Asso-

ciation indicates that fully 50 per cent of the foundry trade is now engaged directly or indirectly on Government work. In the past few weeks, brokers have charged to consumers commissions on unused iron, and a ruling by the Government to the effect that the seller must pay this commission is retarding some early shipment business. We quote f.o.b. Cleveland, as follows:

Bessemer	\$37.25
Basic	33.30
Northern No. 2 foundry.....	33.30
Southern No. 2 foundry.....	37.00
Gray forge	32.30
Ohio silvery, 8 per cent silicon.....	46.12
Standard low phosphorus, Valley furnace.....	50.00

Finished Iron and Steel.—A considerable increase is noted in the demand for steel for other than war work, this being largely for bars, plates and sheets. Roundlot bar orders were placed during the week by Cleveland jobbers. A marked increase has developed in the demand for steel for farm tractors, and inquiries have come out for steel for 2000 large tractors recently placed in Cleveland by the Government. In Government work, there is a heavy demand for steel for motor truck parts. Plate mills are getting a good volume of small business, and there is a steady demand for plates for tanks for oil cars. Building work is about at a standstill and there is little demand for structural material. The George A. Fuller Co., Cleveland, was low bidder for a viaduct in Kansas City which will require 1000 tons of soft steel bars. The demand for sheets is active, and consumers not doing Government work are having difficulty in placing orders.

We quote warehouse prices as follows: Steel bars, 4.03½c.; plates, 4.38½c.; structural material, 4.13½c.; No. 10 blue annealed sheets, 5.35c.; No. 28 black sheets, 6.35c.; No. 28 galvanized sheets, 7.60c.

Iron Ore.—The largest eastern consumer of Lake Superior ore purchased during the week approximately 1,000,000 tons of Lake ore. With this exception, there is little activity in the market. Some reservations have been written into contracts, but many consumers are holding off until they know what their requirements will be. Stocks in furnace yards on May 1 will be very much in excess of what they were on the same date a year ago. We quote f.o.b. lower Lake ports:

Old range Bessemer, \$5.95; old range non-Bessemer, \$5.20; Mesaba Bessemer, \$5.70; Mesaba non-Bessemer, \$5.05.

Old Material.—Scrap is moving better than for several months, and as a result mills are getting all the material they need, and two are reported to have stopped shipments. The market is inactive. Dealers generally are not attempting to make sales on grades that are held at the Government maximum price, waiting for a ruling on the matter of commissions. Some small-lot sales of cast-iron scrap are reported at the Government price of \$35 for scrap broken for the cupola sizes, but foundries are unwilling to pay this price for round tonnages. Some is being offered at \$34. Busheling is quoted at \$30 to \$31, but some dealers are trying to get the Government price of \$32. Turnings are a drug on the market. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$27.00 to \$28.00
Steel rails, rerolling.....	35.00
Steel rails, under 3 ft.....	35.50
Iron rails	40.00
Iron car axles.....	47.50
Steel car axles.....	47.50
Heavy melting steel.....	30.00
Cast borings	20.00
Iron and steel turnings.....	20.00
No. 1 railroad wrought.....	35.00
Hydraulic compressed steel scrap.....	29.00 to 30.00
Cast iron carwheels, unbroken.....	30.00
Cast iron carwheels, broken.....	35.00
Agricultural malleable	24.00 to 25.00
Railroad malleable	35.00
Steel axle turnings.....	25.00
Light bundled sheet scrap.....	24.50 to 25.00
Cast iron scrap	\$30.00
Cast iron scrap, broken to cupola sizes	\$34.00 to 35.00
No. 1 busheling	30.00 to 31.00

Per Net Ton	
Railroad grate bars.....	\$20.00 to \$21.00
Stove plate	20.00 to 21.00

Coke.—The car shortage is nearly as bad as ever, so that coke shipments show very little improvement. There is a great deal of inquiry for prompt-shipment foundry coke, and many consumers who have not al-

ready covered are inquiring for last-half contracts. There are unconfirmed rumors that some prompt-shipment foundry coke is being offered at from \$2 to \$5 a ton above the Government price.

Bolts, Nuts and Rivets.—New demand for bolts and nuts continues fairly active, mostly for Government work. The Government is revising specifications for 55,000,000 bolts and nuts recently asked for by the Quartermaster's Department, and these are expected to be out within a few days. Rivet specifications are coming out in heavy volume from the shipyards.

New York

NEW YORK, March 13.

Pig Iron.—The buying of 35,000 tons of Bessemer pig iron for the Pencoyd plant of the American Bridge Co. from buyers who purchased it originally for export emphasizes the scarcity of pig iron, as the iron is to be used in basic open-hearth furnaces which in ordinary times would be considered very expensive practice. Considerable tonnage still remains at Eastern ports and may eventually be shipped to France, as it was bought at high prices. The inquiry from a St. Louis plant whose buying is done through New York for 10,000 tons of basic for the last half is still pending. A steel casting interest having one plant in New England and two on the Delaware River has purchased about 10,000 tons of basic. Many foundries, particularly the New York district, are having extreme difficulty getting enough pig iron to keep in operation. Some are very near the closing point. We quote as follows for tidewater deliveries:

No. 1 X.....	\$35.25
No. 2 X.....	34.25
No. 2 Plain.....	33.75
No. 2 Southern (rail and water).....	\$38.75 to 39.25
No. 2 Southern (all rail).....	39.15 to 39.65
No. 2 X Virginia.....	37.02

Finished Iron and Steel.—New domestic business is waiting on settlement of the price situation next week, and export business is held up owing to the difficulty of getting licenses, and the net result is a continued quiet. On Tuesday six standardized designs of types of railroad cars were submitted to the Director General of Railroads in behalf of the car builders and the railroads. There is a belief that the Government will ascertain the consensus of price views of the builders and on this basis may establish a buying price calculated to include the uncertain factors of capital and labor charges and a reasonable profit, and that then a pro rata apportionment of the cars will be made. If the procedure in purchasing for our French requirements is followed all of the cars will not be distributed at once, but 200,000 is regarded as the outside total number. In order to save on sheared plates, some of the pressed steel work will be made of universal plates. It appears that some 30,000 tons of 2-in. rounds, bought by France and still in this country, is not now wanted. As yet a price of about 3.50c. per lb. is asked and it is offered only to large-lot buyers. Some warehouses, it seems, are not always adhering to Government prices. Where they happen to have a good supply of material in demand by buyers not regularly their customers, they have been asking more than the 1c. per lb. allowed above mill prices; it is not believed that much of a tonnage is involved. In fabricated steel work about 2500 tons, said to be only the beginning of the work, has been awarded for the Atlas Powder Co., at Perrytown, Md., half to the Levering & Garrigues Co. and half to the McClintic-Marshall Co. The Pennsylvania Railroad has closed on 1500 tons of bridge work and 500 tons for a crane runway at Pitcairn. An addition involving 1000 tons for the Hotel Stenton, Philadelphia, is up for figures. We quote mill shipments of steel bars at 3.095c., New York; shapes, 3.195c.; plates, 3.445c., and bar iron 3.695c., New York. Out-of-store prices are 1c. higher.

Ferroalloys.—The domestic ferromanganese market is quieter. There have been sales in the past week of small lots at \$250, delivered, which seems to be a firm quotation for any delivery. It is stated that this price can be shaded in the West, but nothing lower than

\$250 has been heard of in the East. The only inquiry of consequence is for 600 tons from a Middle Western consumer for delivery in the second half. Considerable lower percentage alloy is being disposed of at about \$3 to \$3.25 per unit. Railroad conditions are so much better that the movement of alloy and ore has been decidedly improved. Press reports are to the effect that the Butte Copper-Zinc Co. has sold 5000 tons of manganese ore, 2500 tons of which went to the Steel Corporation. Generally manganese ore is reported scarce and the February output of ferromanganese was only 17,428 tons, as compared with 22,793 tons in January, as given by the blast-furnace statements of THE IRON AGE. Spiegeleisen is hard to obtain for any delivery, and is quoted at \$70, furnace. The lack of supply is partly explained by a decrease in output and an increased demand. Ferrosilicon, 50 per cent, is active and strong at \$170 to \$190, depending on quantity and delivery. Some other ferroalloys are quoted in this paragraph in the first issue of each month.

Cast Iron Pipe.—Gratifying improvement has taken place in private letting, and there is also increased demand from the Government. Some of the Government demand comes for the extension of pipe lines at various cantonments. Cast iron pipe companies are having a great deal of trouble in obtaining labor, and this is the principal problem before them at the present time. Government prices are as follows: \$55.35, New York, for 6-in. and heavier, and \$58.35 for 4-in.; \$65.35 for 3-in. and \$1 additional for Class A and gas pipe.

Old Material.—The question as to payment of commissions is still a troublesome one, and at present steel companies in eastern Pennsylvania are declining to pay commissions, while buyers in the Pittsburgh district are paying as in the past. It is expressed that a final decision will be made at an early date. The demand for various grades of cast iron is active and the supply limited. While the nominal quotation on stove plate is from \$22 to \$22.50, much higher prices are being paid when it is purchased at the same time as No. 1 machinery cast for which the maximum price is \$32.80, New York. The quotation of \$27.80 on old carwheels is nominal, as there is virtually none of this material available. We quote prices of brokers as follows to New York producers and dealers per gross ton, New York:

Heavy melting steel.....	\$26.70 to \$27.75
Rerolling rails.....	32.60
Relaying rails.....	60.00 to 70.00
Iron and steel car axles.....	45.00
No. 1 railroad wrought.....	32.75
No. 1 railroad wrought cut to not less than 10 in. or over 24 in.....	37.80
Wrought-iron track scrap.....	32.80
No. 1 yard wrought long.....	31.80
Light iron.....	9.00 to 10.00
Cast borings (clean).....	17.80
Machine-shop turnings.....	17.80
Mixed borings and turnings.....	14.50 to 15.50
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long.....	30.75

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:

No. 1 machinery cast.....	\$32.80
No. 1 heavy cast (columns, building materials, etc.).....	27.80
No. 2 cast (radiators, cast boilers, etc.).....	27.80
Stove plate.....	\$22.00 to 22.50
Locomotive grate bars.....	22.00 to 22.50
Malleable cast (railroad).....	32.80
Old carwheels.....	27.80

British Steel Market

Demand for American Wire Rods at \$75 New York—Pig Iron Firm

LONDON, ENGLAND, March 13—(By Cable).

Pig iron continues firm. There is a heavy general demand for American wire rods, \$75, f.o.b. New York, being offered for the Far Eastern trade. Tin plates are firm at 32s. The ferromanganese market is steady. We quote as follows:

Tin plates coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 32s.

Ferromanganese, \$250, c.i.f. for export to America; £26 10s. for British consumption.

Ferrosilicon, 50 per cent, c.i.f. £35 upward.

On other products control prices are as quoted in THE IRON AGE of July 19, 1917, p. 171.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 40c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, 75c.; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is 90c., minimum carload, 40,000 lb.; and 85c., minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 40c., minimum carload 46,000 lb.; to St. Paul, 35.5c., minimum carload 46,000 lb.; Denver, 79c., minimum carload 46,000 lb. A 3 per cent transportation tax now applies.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head bar roofing nails taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large rivets \$4.65 base
7/16 in. x 6 in. smaller and shorter rivets, 45-10 per cent off list
Machine bolts h.p. nuts, 5/8 in. x 4 in.:
Smaller and shorter, rolled threads.....50-10-5 per cent off list
Cut threads50-5 per cent off list
Larger and longer sizes.....40-10 per cent off list
Machine bolts c.p.c. and t. nuts, 5/8 in. x 4 in.:
Smaller and shorter.....40-10 per cent off list
Larger and longer.....35-5 per cent off list
Carriage bolts, 5/8 in. x 5 in.:
Smaller and shorter, rolled threads.....50-5 per cent off list
Cut threads40-10 per cent off list
Larger and longer sizes.....40 per cent off list
Lag bolts50-10 per cent off list
Plow bolts, Nos. 1, 2, 3.....50 per cent off list
Hot pressed nuts, sq., blank.....2.50c. per lb. off list
Hot pressed nuts, hex., blank.....2.30c. per lb. off list
Hot pressed nuts, sq., tapped.....2.30c. per lb. off list
Hot pressed nuts, hex., tapped.....2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank.....2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped.....2.00c. per lb. off list
Semi-finished hex. nuts:
5/8 in. and larger.....60-10-10 per cent off list
9/16 in. and smaller.....70-5 per cent off list
Stove bolts70-10 per cent off list
Stove bolts2 1/2 per cent extra for bulk
Tire bolts50-10-5 per cent off list

The above discounts are from present lists now in effect. All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4 1/2 in. and heavier, per 100 lb., \$3.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$4.90. Boat spikes, \$5.25 per 100 lb. f.o.b. Pittsburgh.

Terne Plate

Effective Nov. 7 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I. C., \$15.30; 12-lb. coating, I. C., \$16.75; 15-lb. coating, I. C., \$17.75; 20-lb. coating, I. C., \$19; 25-lb. coating, I. C., \$20; 30-lb. coating, I. C., \$21; 35-lb. coating, I. C., \$22; 40-lb. coating, I. C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	44	17 1/2	1/8 and 1/4	23	+4
1/2	48	33 1/2	3/8	24	+3
3/4 to 3	51	37 1/2	1/2	28	10
			3/4 to 1 1/2	33	17
Lap Weld			Lap Weld		
2	44	31 1/2	1 1/4	18	3
2 1/2 to 6	47	34 1/2	1 1/2	25	11
7 to 12	44	30 1/2	2	26	12
13 and 14	34 1/2	..	2 1/2 to 6	28	15
15	32	..	7 to 12	25	12
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
1/8, 1/4 and 3/8	40	22 1/2	1/8, 1/4 and 3/8	22	5
1/2	45	32 1/2	1 1/2	27	14
3/4 to 1 1/2	49	36 1/2	3/4 to 1 1/2	33	18
2 to 3	50	37 1/2			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	42	30 1/2	1 1/4	19	4
2 1/2 to 4	45	33 1/2	1 1/2	25	11
4 1/2 to 6	44	32 1/2	2	27	14
7 to 8	40	26 1/2	2 1/2 to 4	29	17
9 to 12	35	21 1/2	4 1/2 to 6	28	16
			7 to 8	20	8
			9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel	Charcoal Iron
3 1/2 to 4 1/2 in. 34	3 1/2 to 4 1/2 in. 12 1/2
2 1/2 to 3 1/4 in. 24	3 to 3 1/4 in. + 5
2 1/4 in. 17 1/2	2 1/2 to 2 3/4 in. + 7 1/2
1 3/4 to 2 in. 13	2 to 2 1/4 in. + 22 1/2
	1 1/2 to 1 3/8 in. + 35

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton	Per Net Ton
1 in. \$340	1 1/4 in. \$220
1 1/4 in. 280	2 to 2 1/2 in. 190
1 3/8 in. 270	2 1/2 to 3 1/4 in. 180
1 1/2 in. 220	4 in. 200
	4 1/2 to 5 in. 220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days:

Blue Annealed—Bessemer	Cents per lb.
No. 8 and heavier.....	4.20
Nos. 9 and 10.....	4.25
Nos. 11 and 12.....	4.30
Nos. 13 and 14.....	4.35
Nos. 15 and 16.....	4.45

Box Annealed, One Pass Cold Rolled—Bessemer

Nos. 17 to 21.....	4.80
Nos. 22 and 24.....	4.85
Nos. 25 and 26.....	4.90
No. 27.....	4.95
No. 28.....	5.00
No. 29.....	5.10
No. 30.....	5.20

Galvanized Black Sheet Gage—Bessemer

Nos. 10 and 11.....	5.25
Nos. 12 and 14.....	5.35
Nos. 15 and 16.....	5.50
Nos. 17 to 21.....	5.65
Nos. 22 and 24.....	5.80
Nos. 25 and 26.....	5.95
No. 27.....	6.10
No. 28.....	6.25
No. 29.....	6.50
No. 30.....	6.75

Tin-Mill Black Plate—Bessemer

Nos. 15 and 16.....	4.80
Nos. 17 to 21.....	4.85
Nos. 22 to 24.....	4.90
Nos. 25 and 27.....	4.95
No. 28.....	5.00
No. 29.....	5.05
No. 30.....	5.05
Nos. 30 1/2 and 31.....	5.10

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin, New	Lead, New		Spelter, New		
Lake	Electrolytic	York	York	Louis	York	Louis	
Mar. 6.....	23.50	23.50	*85.00	7.25	7.10	7.75	7.50
7.....	23.50	23.50	*85.00	7.25	7.10	7.75	7.50
8.....	23.50	23.50	*85.00	7.25	7.10	7.75	7.50
9.....	23.50	23.50	*85.00	7.25	7.10	7.75	7.50
11.....	23.50	23.50	*85.00	7.25	7.10	7.75	7.50
12.....	23.50	23.50	*85.00	7.25	7.10	7.75	7.50

*Nominal.

NEW YORK, March 13.

The markets continue quiet and featureless. Efforts to raise the price of copper absorb interest in the copper market. Tin is active for future delivery and higher, but spot metal continues unobtainable. Lead is quiet again, but steady. Antimony is in poor demand and lower.

New York

Copper.—Apparently strenuous plans are on foot to have the present Government price of 23.50c. for copper raised to as high as 25c. per pound by June 1, when the present schedule expires, or earlier. It is contended that costs have gone up sufficiently to justify an advance and to insure adequate output. Some in the trade believe that the price will be advanced, while others do not. Smelter output is growing and some think that by the end of March it will be at the rate of 200,000,000 lb. per month. Imports of raw copper are also larger than in 1917, being now at the estimated rate of 24,000 to 25,000 tons per month, against about 20,000 tons in 1917. There is very little domestic buying outside of Government work. The London market is unchanged at £125 for spot electrolytic and £121 for futures, the official prices which have stood for a long time.

Tin.—A feature of the market is that yesterday, for the first time in many years or perhaps in the history of this market, no price was obtainable on Straits tin for any position. In the last few days also there have been no offers of Straits tin for future shipment from England. There has been considerable interest manifested by some buyers, but there have been no sellers. As a result buyers have bid the market up on themselves, future shipments reaching 75c. per lb. Demand the last week has been good as a whole, but sellers have been few, and some have even withdrawn altogether from the market. Cablegrams are later than ever. It takes four days now to send over a message and obtain a reply, greatly delaying business. Arrivals to March 12, inclusive, have been 997 tons, with 6300 tons reported afloat. The London market has again advanced, the quotation for spot Straits yesterday having been £322 10s., as compared with £319 5s. a week ago. Spot Straits is nominal at about 85c. per lb., New York.

Lead.—Demand has slackened and prices are unchanged at 7.25c. New York and 7.10c. St. Louis in the outside market for early delivery. The quotation of the leading interest is also unchanged at 7.25c. New York. The tone is firm and transportation conditions are better. With the advent of spring a revival of demand is looked* for, with better business. Buyers of spot metal are scarce, and there has not been the demand there was a week ago. One dealer sold spot lead in the last week at 7.87½c. New York. Some quote the spot market at 7.75c. New York.

Spelter.—The market continues inactive and weak. Prime Western has sold in the past week as low as 7.50c. St. Louis or 7.75c. New York, for early delivery, but some of this has been on a cash basis, which is rather unusual. Some dealers or producers refuse to bid under 7.62½c. St. Louis, or even 7.75c. St. Louis, but there are others who will go lower. In any event

the volume sold has been small and parceled out at that. Production is estimated to have declined to 50 per cent of capacity. The Government continues to absorb large quantities of Grade A, and there are some indications of a scarcity in the near future. At present, supply is about equal to demand, but large orders for Government shells and cartridges are imminent before long and will make inroads on the supply. Even now some redistilling of lower grades is being carried on to produce Grade A.

Antimony.—If anything, the market is nominally lower, at 13.25c. New York, duty paid, for Chinese and Japanese grades for prompt and early delivery.

Aluminum.—The Government price of 32c. per lb. for 50-ton lots or more of No. 1 virgin metal, 98 to 99 per cent pure, is the only quotation. For smaller quantities and other grades nothing has been given out and there are no quotations.

Old Metals.—The market is quiet. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible (nominal).....	23.50
Copper, heavy and wire (nominal).....	23.50
Copper, light and bottoms.....	21.00 to 21.50
Brass, heavy.....	16.25 to 16.50
Brass, light.....	12.25 to 12.50
Heavy machine composition.....	23.75 to 24.00
No. 1 yellow rod brass turnings.....	13.50 to 14.00
No. 1 red brass or composition turnings.....	19.00 to 20.00
Lead, heavy.....	6.50 to 6.75
Lead, tea.....	5.25
Zinc.....	6.00

Chicago

MARCH 11.—For copper there is a steady demand. By some interests it is said that the supply is ample, but that shipments are lagging, while others say the producers are sold up and that a shortage may make itself felt in the next 30 to 60 days. In a small way tin is in brisk demand. Lead and spelter are quiet. Offerings of spelter are numerous, but buyers are few, the situation of a few weeks ago being reversed. We quote: Copper, 23.50c., in carloads, and 24.67½c. for part carloads; tin, 88c.; spelter, 7.60c.; lead, 7.20c., and antimony, 15.50c. to 16c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper clips, 20c.; copper bottoms, 19c.; red brass, 20c.; yellow brass, 14.50c.; lead pipe, 5.50c.; zinc, 5.25c.; pewter, No. 1, 42.50c.; tinfoil, 50c., and block tin, 57.50c.

St. Louis

MARCH 11.—The non-ferrous metals have been quiet the past week. Lead has been firm, while spelter has weakened. The quotations at the close of to-day's market for carload lots was: Lead, 7.25c.; spelter, 7.65c. to 7.70c. In less than carload lots they were: Lead, 7.75c.; spelter, 8.50c.; tin, 90c.; copper, 25.12c.; Asiatic antimony, 17.50c. In the Joplin district ore prices were generally strong, with zinc blende well held at \$50 to \$65 per ton, basis of 60 per cent metal, with the average for the week at \$55 because of the quantity of second-grade ores sold. There is still serious difficulty in getting cars for the shipment of ore. Lead ore was stronger and reached \$87.50 per ton, with even higher prices paid on settlement for premium grades. The average for the week was \$86 per ton. Calamine ranged from \$30 to \$35 per ton, basis of 40 per cent metal, with the average for the week for the district \$33 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 20c.; pewter, 25c.; tinfoil, 50c.; lead, 5c.; zinc, 5.50c.; tea lead, 5c.

The Toledo Electric Steel Organization, Toledo, Ohio, manufacturer of high speed and special alloy steels, will place contracts very soon for the erection of a new steel mill building and will materially enlarge its plant. The company is in the market for one 12-in. three-high tool steel bar rolling mill with drive, three water tube boilers and stack. A 3-ton electric furnace and a 5, 3, 2 and 1 ton hammer, second-hand, also are sought.

Buffalo

BUFFALO, March 12.

Pig Iron.—Persistent inquiry for all grades of iron aggregating thousands of tons continues, although users are more and more realizing that very little iron for new needs is obtainable, and that producers are unable to care for even a small proportion of the new business offered them and are avoiding the taking on of further obligations for last-half deliveries.

We continue the schedule of Government-established prices, as follows, f.o.b. furnace, Buffalo:

No. 1 foundry.....	\$34.50
No. 2 X.....	33.50
No. 3 foundry.....	32.50
Gray forge.....	32.00
Malleable.....	33.50
Basic.....	33.00
Lake Superior charcoal, f.o.b. Buffalo.....	39.75

Old Material.—The week has shown quite active demand for all lines of scrap commodities, particularly for turnings, in which a good business has been done. Shell turnings continue to come into the market in considerable quantities, and so far all offerings in this class of scrap have been absorbed. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel.....	\$30.00
Low phosphorus.....	40.00
No. 1 railroad wrought.....	35.00
No. 1 railroad and machinery cast.....	35.00
Iron axles.....	\$45.00 to 47.50
Steel axles.....	45.00 to 47.50
Carwheels.....	30.00
Railroad malleable.....	35.00
Machine shop turnings.....	18.50 to 25.00
Heavy axle turnings.....	25.00
Clean cast borings.....	19.00 to 20.00
Iron rails.....	37.00 to 38.00
Locomotive grate bars.....	25.00
Stove plate.....	25.00
Wrought pipe.....	28.00 to 29.00
No. 1 busheling scrap.....	30.00 to 31.00
No. 2 busheling scrap.....	22.00 to 24.00
Bundled sheet stamping scrap.....	22.00 to 24.00

IRON AND INDUSTRIAL STOCKS

Readjustment of Market Progresses on the Basis of a Long and Costly War

Following the banishment of peace rumors and the disappearance of the speculative trading element the middle of last week as a result of continued German aggression in Russia, the market settled itself down to a period of readjustment based on the prospect of a long and costly war. With the creating of the War Finance Corporation nearer realization, iron and industrial stocks were strengthened somewhat.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com. 24 5/8 - 26 1/2	Int. Har. Corp. com. 60 1/2
Allis-Chalm. pf. 80 3/4 - 83 1/2	Lacka. Steel 79 1/4 - 81 5/8
Am. Can. com. 39 5/8 - 41 5/8	Lake Super. Corp. 15 3/4 - 16 3/4
Am. Can. pf. 96 3/4 - 97	Midvale Steel 44 1/2 - 45 1/2
Am. Car & Fdry. com. 76 - 79 1/2	Nat.-Acme 29 3/8 - 29 3/4
Am. Loco. com. 65 3/4 - 66 3/4	Nat. En. & Stm. com. 48 - 49 1/4
Am. Loco. pf. 99 3/8 - 99 1/2	N. Y. Air Brake 124 - 130
Am. Radiator com. 265	Nova Scotia Steel 63 3/8 - 64
Am. Ship com. 96 1/2 - 99	Press. Steel com. 62 - 64 3/4
Am. Steel Fdries. 64 3/4 - 66 1/2	Press. Steel pf. 95
Bald. Loco. com. 75 3/4 - 79 3/4	Ry. Stl. Spr. com. 53 3/8 - 55 3/4
Beth. Steel com. 81 5/8 - 82 3/4	Ry. Stl. Spr. pf. 98
Beth. Stl. Cl. B. 78 - 81	Republic com. 79 - 81 1/4
Cent. Fdry. com. 26 - 28 1/4	Republic pf. 97 - 97 1/2
Cent. Fdry. pf. 41 1/2 - 43	Sloss com. 51 - 55 3/4
Charc. Iron com. 8 1/2 - 8 5/8	Superior Steel 35 3/4 - 36 1/2
Chic. Pn. Tool 50 1/4 - 54 1/2	Transue-Wms. 40
Colo. Fuel 38 3/4 - 40	Un. Alloy Steel 39
Cruc. Steel com. 62 1/2 - 64 3/4	U. S. Pipe com. 14 - 14 1/4
Cruc. Steel pf. 89 1/4 - 89 3/4	U. S. Pipe pf. 43 - 45
Deere & Co. pf. 95 1/4	U. S. Steel com. 90 1/4 - 92 3/4
Gen. Electric 139 1/4 - 141 3/4	U. S. Steel pf. 109 3/4 - 110 1/4
Gt. No. Ore Cert. 28 - 29 5/8	Va., L. C. & Coke 65 - 66
Gulf States Steel 93	Westingh. Elec. 41 1/4 - 42 1/4
Int. Har. of N. J. com. 124 - 126 1/2	

Dividends

The Allis-Chalmers Mfg. Co., quarterly, 1% per cent on the preferred and extra 3/4 per cent on account of accumulated dividends, payable April 15.

The American Steel Foundries, quarterly, 1% per cent, payable March 30.

The Canadian General Electric Co., quarterly, 2 per cent on the common, payable April 1.

The Nova Scotia Steel & Coal Co., quarterly, 1 1/4 per cent on the common and 2 per cent on the preferred, payable April 15.

Rules Relating to Tin Plate Exports

WASHINGTON, March 12.—Owing to the anticipated scarcity of tin, the War Trade Board is drawing the lines more tightly about the exportation of tin plate and has promulgated a series of rulings placing comprehensive restrictions upon all shipments of tin and terne plate to foreign countries. Under these new regulations licenses may be granted to manufacturers of tin plate and terne plate or to persons other than a manufacturer, provided the purchase of the plate has been made directly from a manufacturer prior to Nov. 12, 1917, and also provided such purchase has been made to fulfill a contract or firm order from a purchaser abroad placed with a firm in the United States, a copy of which must be annexed to the application.

Export licenses for tin plate or terne plate may be granted only for shipment to Canada, South and Central American countries, including Mexico and the West Indies, China and Japan, and only when the plate is to be used either (1) to manufacture containers for edibles for human consumption by the people of the nations at war with Germany or her allies, or (2) to manufacture oil cans, provided that the plate has been ordered from the mill on or before Aug. 27, 1917. In this case there shall be no distinction made between purchases from manufacturers and purchases from others, or (3) when the plate is to be shipped to any of the above-mentioned countries except Canada, it is to be used for purposes which shall contribute directly to the successful prosecution of the war; or (4) when the plate is destined for Canada it is to be used for purposes for which tin plate or terne plate is now permitted to be used in the United States.

In all cases the application should be accompanied by an affidavit verifying all the statements in the application.

Manganese Imports Declining

Ferromanganese imports in January were 1050 gross tons, of which 650 tons came through Philadelphia and 400 tons through New Orleans. The January total was the lowest for any month since early in the war. The preceding lowest recent record was 1512 tons last November, which was the bottom for 1917. The total imports for the 7 months ended Jan. 31, 1918, were 15,835 tons, as compared with 49,356 tons for the same 7 months ended Jan. 31, 1917.

Manganese ore imports in January were 42,947 gross tons, as compared with 49,530 tons in January, 1917. The total for the seven months ended Jan. 31, 1918, was 356,129 tons, against 388,828 tons for the corresponding seven months a year ago.

Westinghouse Company Leases Mansfield Plant

PITTSBURGH, March 13—(By Wire).—The Westinghouse Electric & Mfg. Co. has leased for a period of years the Baxter Stove Co., Mansfield, Ohio, with the intention of consolidating at this plant the manufacture of its heating appliances now being carried on at some of the other Westinghouse plants.

The Pittsburgh service department of the Westinghouse Electric & Mfg. Co. has moved from its former location on Amberson Avenue to new quarters at 6905 Susquehanna Street in the Homewood district of Pittsburgh. Express and freight should be consigned to East Liberty, Pa., via Pennsylvania Railroad. The automobile equipment service department has also moved to the new location.

The Milwaukee County Council of Defense, Milwaukee, Wis., is raising a fund of \$30,000 by popular subscription among manufacturers for the purpose of establishing and maintaining a bureau of information at Washington, D. C. The main function of the proposed bureau will be to obtain Government contracts for Milwaukee manufacturers which under ordinary circumstances would not come to the attention of local shops.

PERSONAL

R. T. West, formerly president of the Vulcan Steel Products Co., has established himself in the iron and steel business at 141 Broadway, New York, devoting himself chiefly to export matters.

Frederick S. Chase has become president of the Chase Companies, Inc., Waterbury, Conn., succeeding his brother, the late Henry S. Chase. Another brother, Irving H. Chase, is vice-president. Frederick S. Chase has been treasurer for a number of years.

I. E. Edwards, for 12 years chief engineer of the Valley Mold & Iron Corporation at Sharpsville, Pa., has resigned to accept the position of works manager of the ingot mold foundry of the Marshall Foundry Co., at Josephine, Pa.

At the annual meeting of the Central Steel Co., Massillon, Ohio, recently Peter Benninghoffen of Hamilton, Ohio, and F. H. Snyder of Massillon were added to the directorate. The old officers were re-elected. They are: R. E. Bebb, president; F. J. Griffiths, vice-president and general manager, and C. S. Stuart, secretary-treasurer.

W. F. Wagner, after 52 years of service, has severed his connection with William Jessop & Sons, and is now sales manager of the Seaport Steel Co., with offices at 217 Broadway, New York. This company specializes in high-speed, alloy and carbon tool steels and carbon sheet steel and forgings.

Edward P. Carroll, general superintendent Columbus-McKinnon Chain Co., Lebanon, Pa., celebrated his sixtieth birthday anniversary last week. Among the many remembrances to him was a certificate from the management of the company transferring 50 shares of preferred stock to his name.

S. W. Kirk of Kirk & Blum, sheet metal workers, Cincinnati, has returned from several weeks' vacation spent at Miami and Palm Beach, Fla.

J. Stanford Brown has resigned as a director of the Carpenter Steel Co., Reading, Pa. He will be succeeded on April 1 by Charles T. Meily, formerly of Philadelphia.

B. T. Bacon, Pickands, Brown & Co., Chicago, left March 9 on a trip to Arizona and the Pacific Coast. He will be away about two months.

J. A. Wilson, for many years a member of the sales department of the Vandyck-Churchill Co., machine tools, Singer Building, New York, has been appointed sales manager.

Leon O. Hart, who became associated with the Driver-Harris Co., Harrison, N. J., as electrical engineer in October, 1908, and since March, 1917, has been assistant treasurer, is now treasurer and a director of the company. He was graduated from the Stevens Institute of Technology in 1907.

The Walter A. Zelnicker Supply Co., St. Louis, has recently secured the services in its machinery department of G. W. Bichlmeir, formerly connected with the supply departments of the Missouri Pacific and Kansas City Southern Railway companies, as well as having been secretary-treasurer of the W. L. Sullivan Machinery Co.

A. B. Hall, vice-president of the Whitman & Barnes Mfg. Co., Akron, Ohio, will hereafter have supervision of the company's sales. For the past 21 years he has been connected with the company in various sales and official capacities. For a number of years he was with the company's Chicago sales office as manager. R. S. Carter, district representative of the company with headquarters in Pittsburgh, has been promoted to sales manager and will have direction of twist drill and reamer sales from the Akron office. H. E. Fisher, formerly with the Pittsburgh Model Engine Co., and Paul

E. Thomas, formerly connected with the traffic department of the Seaboard Air Lines, have become connected with the Whitman & Barnes Mfg. Co. Mr. Fisher succeeds R. S. Carter as mechanical engineer and will have charge of sales in the Pittsburgh district. Mr. Thomas' position will be that of sales manager in charge of the department of wrenches and spring cutters.

E. B. Winsted, general sales agent Janesville Machine Co., Janesville, Wis., has resigned, effective April 1, to accept the position of manager of the Indianapolis Ind., branch of the Stover Engine & Mfg. Co., Freeport, Ill.

W. H. Thompson, for many years connected with the Westinghouse Electric & Mfg. Co., has resigned to accept the position of works manager of the Fairmont Mining Machinery Co., Fairmont, W. Va., maker of coal-mining equipment.

J. C. Holding, for 15 years in the bureau of structural shapes and plates, general sales department, Carnegie Steel Co., has resigned to enter the sales department of the Midvale Steel & Ordnance Co. Mr. Holding was formerly with the Keystone Bridge Works, Pittsburgh, before becoming connected with the Carnegie Steel Co.

Vere Brown, formerly assistant general manager of the Allegheny Steel Co., Brackenridge, Pa., has been appointed general manager to succeed W. Lester Walker, who died in October. E. P. Perkins, formerly superintendent of the plate mill, has been made assistant general manager to succeed Mr. Brown.

W. M. Clyde, sales engineer at Cincinnati for the Motch & Merryweather Machinery Co., is recovering from a severe illness, which confined him to a hospital for more than three weeks.

Allan C. Davidson has been made chief clerk of the Mahoning division of the Sharon Steel Hoop Co., at Youngstown, Ohio, succeeding Walter E. Brown, who resigned. Mr. Davidson had previously been cost accountant in the pressed steel department, and also was in the auditor's office of the Sharon Steel Hoop Co. of Sharon. Former associates of Mr. Brown gave him a diamond pin as a token of their regret and good wishes. He had been connected with the Sharon Steel Hoop Co. for about 15 years.

John S. Agey, for 13 years employed by the Carnegie Steel Co., at Youngstown, Ohio, has resigned to accept a position as assistant superintendent of one of the mills of the Donner Steel Co., at Buffalo. For sometime he has been in charge of shipping at the lower mills of the Carnegie Steel Co., at Youngstown.

Paul T. Irvin, who has been associated with the Wells Bros. Co. and the Greenfield Tap and Die Corporation, Greenfield, Mass., for 12 years, has resigned his position as sales manager of the gage division to accept the position of general sales manager of Lincoln Twist Drill Co., Taunton, Mass. Edward Blake, Jr. (formerly of Wells Bros. Co.), is vice-president and general manager of the Taunton company, and Frank O. Wells, president, and Frederick H. Payne, vice-president of the Greenfield Tap & Die Corporation, are directors.

T. I. Crane, Philadelphia, president Northern Ore Co., has returned from a stay of several weeks in Florida.

R. C. Hoffman, Jr., vice-president R. C. Hoffman & Co., iron and steel merchants, Continental Building, Baltimore, has been elected president of the Maryland Bolt Co., succeeding Mason D. Pratt who retired in January. Other officers of the company are: John T. Hill, vice-president; J. Wm. Hill, secretary, and A. E. Rudolph, treasurer, making the management practically identical with R. C. Hoffman & Co., Inc.

The summer meeting of the American Institute of Chemical Engineers will be held in Berlin, N. H., June 19 to 22. Headquarters will be at Mt. Madison House, Gorham, N. H.

RAILROAD BUYERS NAMED

Railroad Administration Appoints Men to Supervise Extensive Purchases

Director General of Railroads McAdoo has announced the appointment of a number of assistants to John Skelton Williams, director of the Railroad Administration's division of finances and purchases, which is to spend between a billion and two billion dollars this year.

The Advisory Committee for Finances is composed of Franklin Q. Brown, New York; Festus J. Wade, St. Louis, and Frederick W. Scott, Richmond, Va., all bankers.

The Central Advisory Purchasing Committee, with headquarters at Washington, is composed of Henry B. Spencer, Washington, vice-president of the Southern Railway, in charge of purchases; Samuel Porcher, Philadelphia, purchasing agent of the Pennsylvania Railroad, and George G. Yeomans, New Haven, purchasing agent of the New York, New Haven & Hartford.

The Regional Purchasing Committee for the East, with headquarters at New York, follows: E. H. Bankard, general purchasing agent of the Baltimore & Ohio; H. B. Wight, New York, purchasing agent of the New York Central, and E. T. Burnett, Roanoke, Va., purchasing agent of the Norfolk & Western.

The Committee in Charge of Purchases for Roads West of the Mississippi, with headquarters at Chicago, consists of Charles A. How, purchasing agent of the Missouri Pacific; L. S. Carroll, general purchasing agent of the Chicago & Northwestern, and Ira O. Rhoads, general purchasing agent of the Southern Pacific.

The Purchasing Committee for the South, with headquarters at Atlanta, is composed of F. H. Fechtig, purchasing agent of the Atlantic Coast Line; Albert C. Mann, purchasing agent of the Illinois Central, and H. T. Shanks, purchasing agent of the Louisville & Nashville.

Mr. McAdoo commented as follows on reports that the Railroad Administration contemplated a permanent system of restricting shipments of non-essential commodities:

"It is not the intention of the Railroad Administration to interfere with normal commercial shipments. It has been necessary to give preferential service to supplies of food, fuel and munitions. It is expected that within a short time the railroads will be in a position to handle commercial shipments in the usual way. We have not at any time issued orders interfering with commercial business except when it was necessary to do so on account of special services being required for the commodities above mentioned. Embargoes have been placed on the various railroads, due to conditions caused by the extreme weather and the accumulation at certain Atlantic ports."

Launching of Steel Ships

WASHINGTON, March 12.—An encouraging rate of speed in the launching and delivery of steel ships is being developed, according to figures made public by the United States Shipping Board. If the present rate of gain from month to month should prevail throughout the year the most optimistic prediction heretofore made by Chairman Hurley would be far more than realized.

During January nine vessels with a total tonnage of 79,541 tons were delivered while 16 vessels of 112,500 tons were launched. In February the number of ships completed and put into service rose to 17, with a total of 120,700 tons, while 15 vessels of 77,900 tons were launched. According to the latest information of the Emergency Fleet Corporation the launchings during March will include 35 vessels with a total of 220,591 tons.

The vessels completed in February included 15 cargo ships, one tanker and one collier, while the March schedule calls for the delivery of 14 cargo ships, seven tankers and two colliers.

HIGHER COKE PRICES

Advances Granted on Certain Grades in Three States—Coal Condemned

WASHINGTON, March 12.—New prices for coke at open in certain parts of West Virginia, Pennsylvania and Tennessee have been promulgated by the United States Fuel Administration, effective March 1.

Coke made in Preston County, W. Va., on the Baltimore & Ohio Railroad, between Tunnelton and Gratton and Meriden, Barbour County, was fixed at \$6.75 for blast furnace coke and \$7.75 for selected 72-hr. foundry coke. The former prices were \$6 for the first-named class of coke and \$7 for the latter.

In the Flat Top or Pocahontas district of West Virginia the maximum was placed at \$8. The former prices were \$6 for furnace coke and \$7 for the foundry grade.

Selected foundry coke manufactured in Indiana County, Pa., from washed coal taken exclusively from the lower bench of coal of the upper Freeport seam, is placed at \$8 if the ash exceeds 10 per cent or the sulphur exceeds 9 per cent, and \$8.50 if the ash is less than 10 per cent and the sulphur is less than 9 per cent. The former price was \$7.

By-product coke made in by-product ovens at Chattanooga, Tenn., shall be as follows: For run of oven coke, \$8.25; for crushed coke more than 1 in. in size, \$8.75, and for selected foundry coke, \$9.25. The latter is a new operation and no comparative prices were available.

Further classification of bituminous coal mines in West Virginia has been made by the Fuel Administration establishing new maximum prices at the mines in the whole of Wayne County. The mines affected are a part of the Kenova and Thacker fields. The prices do not include the allowance made to operators for such wage increase as may be applicable under the Washington wage agreement.

The maximum prices fixed in the order are: Run of mine, \$2.40; prepared sizes, \$2.65; slack or screenings, \$2.15. The former prices were: Run of mine, \$2; prepared sizes, \$2.25; slack or screenings, \$1.75. The order was made effective at 7 a. m., March 5.

Representatives of the Fuel Administration have condemned more than 1600 tons of anthracite coal in the Pennsylvania markets in connection with the campaign now on foot to compel the delivery of clean coal. At the mines inspectors of the Fuel Administration also condemned several cars a day because they were loaded with coal, much of which did not come up to the standard as to size and quality.

These facts are contained in a report by Federal Fuel Administrator William Potter, of Pennsylvania, to United States Fuel Administrator Garfield, covering the work done in Pennsylvania during the last three weeks, to prevent the unloading of unclean coal on the public. Administrator Potter indicated in his report that the campaign in the anthracite district has been so successful that similar work is now to be done in the bituminous fields of that State. The large shippers of anthracite, Mr. Potter states in his report, after indorsing the standard of preparation adopted by the fuel administration, are keeping their word and are now sending properly sized and prepared coal to all markets.

Some of the small operators have been giving trouble, but the unloading of the cars which contained the coal condemned because it did not measure up to the requirements is believed to have effectually ended the practice. Administrator Potter has communicated with county chairmen in the various bituminous coal districts as well as with the operators and the miners in prosecution of the campaign for clean coal from those mines.

The Gorham Mfg. Co., Providence, R. I., is selling through a syndicate of Boston and Providence bankers \$3,000,000 first mortgage bonds, bearing interest at 7 per cent. The company has munitions contracts aggregating \$9,500,000 and will use the new funds to carry out these contracts.

Ten Munition-Making Districts Are Established

WASHINGTON, March 12.—The acting Secretary of War has asked Congress for an urgent deficiency appropriation of \$400,000,000 for the manufacture of ordnance, principally heavy guns. It is probable that considerable new plant capacity will have to be provided for the execution of this program. While no payments are likely to be called for on account of this work in the current fiscal year, it will be necessary for Congress to authorize the appropriation at an early date as the department cannot sign contracts until the money has actually been provided.

The War Department announces that in order to bring about decentralization and closer contact with manufacturers of war munitions General Wheeler, acting chief of the Ordnance Department, has divided the country into munition districts, with headquarters for the different zones at Pittsburgh, Cleveland, Rochester, N. Y.; Boston, New Haven, Detroit, Cincinnati, Chicago, New York and Philadelphia. The heads of the district offices in charge of production are as follows:

Pittsburgh: Ralph M. Dravo, Dravo Brothers, contractors, Pittsburgh.

Cleveland: Samuel Scovill, who resigned as president of the Cleveland Illuminating Co.

Rochester, N. Y.: F. S. Noble, one of the chief executives of the Eastman Kodak Co.

Boston: Levi H. Greenwood, Wakefield Rattan Co.

New Haven: Waldo C. Bryant, president Bryant Electric Co., Bridgeport, Conn.

Detroit: Fred. J. Robinson, president Lowrie & Robinson Lumber Co.

Cincinnati: Charles L. Harrison, Cincinnati Chamber of Commerce.

Chicago: E. A. Russell, vice-president Otis Elevator Co.

New York: Samuel G. Allen, chairman Lima Locomotive Works.

Philadelphia: John C. Jones, Harrison Safety Boiler Works, Philadelphia.

The territory covered by the different districts is outlined below. The comparatively few industries not embraced in those districts will deal directly with the production division in Washington as heretofore.

The Chicago district comprises the State of Indiana north of the north boundary line of the following counties: Warren, Tippecanoe, Clinton, Howard, Grant, Blackford, Jay, and the States of Illinois, Wisconsin and Minnesota.

The Cincinnati district comprises the State of Ohio north of the north boundary line of the following counties: Darke, Miami, Clarke, Fayette, Pickaway, Fairfield, Perry, Morgan, Noble, Monroe, and the State of Indiana south of the north boundary line of the following counties: Warren, Tippecanoe, Clinton, Howard, Grant, Blackford, Jay, and the State of Kentucky.

The Detroit district comprises the State of Michigan.

The Pittsburgh district comprises the State of West Virginia and that part of Pennsylvania, except Erie, Crawford and Mercer counties, lying west of the west boundary line of the following counties: Tioga, Lycoming, Mifflin, Juniata, Perry, Cumberland and Adams, and Belmont and Jefferson counties, Ohio.

The Boston district comprises that part of Massachusetts lying east of the west boundary line of Worcester County, and the States of Rhode Island, Maine, New Hampshire and Vermont.

The New Haven district comprises the State of Connecticut and the following counties in western Massachusetts: Berkshire, Franklin, Hampshire and Hampden.

The Cleveland district comprises that part of the State of Ohio lying north of the north boundary line of the following counties: Darke, Miami, Clarke, Fayette, Pickaway, Fairfield, Perry, Morgan, Noble, Belmont and Jefferson, and the following counties in Pennsylvania: Erie, Crawford and Mercer.

The Rochester district comprises the State of New York except the following counties: Greene, Columbia, Ulster, Sullivan, Dutchess, Orange, Putnam, Westchester, Rockland, Nassau, Suffolk and Greater New York.

The New York district comprises that part of the State of New York lying south of the south boundary line of the following counties: Rensselaer, Albany, Schoharie and Delaware, east of the west State line of New Jersey and north of the north lines of the following counties in New Jersey: Mercer and Ocean, and west of the State lines of Massachusetts and Connecticut.

The Philadelphia district comprises the eastern half of the State of Pennsylvania lying east of the west boundary line of the following counties: Tioga, Lycoming, Mifflin, Juniata, Perry, Cumberland and Adams, and the following counties in New Jersey: Mercer, Ocean, Gloucester, Burlington, Cumberland, Atlantic and Cape May, and all of the State of Delaware.

Col. Guy E. Tripp, New York, formerly chairman of the Westinghouse Electric & Mfg. Co. and now chief of the production division of the Ordnance Department, worked out the details of the plan for decentralization and closer contact with the manufacturing districts. Gen. W. S. Pierce, head of the bureau in which is the finance division of the Ordnance Department, and Col. B. W. Dunn, head of the inspection division, have arranged to follow the same decentralization plan, and will have their field forces in the same district headquarters as the production division. Col. Samuel McRoberts, formerly vice-president and executive manager of the National City Bank, who has been at the head of the procurement division of the Ordnance Department for some time, will co-operate with the district officers.

W. L. C.

Annual Meeting Cincinnati Branch, Metal Trades Association

The annual meeting of the Cincinnati Branch, National Metal Trades Association, was held at the Cincinnati Business Men's Club on the evening of March 7. President A. H. Tuechter presided. W. H. Vandervoort, president of the Root & Vandervoort Engineering Co., Moline, Ill., was the principal speaker.

Mr. Vandervoort, who is a member of the Council for National Defense, delivered a stirring and patriotic address, in which he strongly advocated the wholehearted support of the Government by every citizen. He pointed out that the machine-tool builders especially carried a load of responsibility that was not equaled by any other manufacturers, and he alluded with pride to the hearty support rendered the Government by the machine-tool people since war was declared.

Charles A. Hinsch, president of the Fifth-Third National Bank, Cincinnati, and also president of the American Bankers' Association, spoke on the thrift-stamp campaign and urged all employers present to do all in their power toward inducing the workmen to take more interest in this campaign.

The report of Business Secretary J. M. Manley showed that there had been an increase in membership during the past year, and he also pointed out that while other parts of the country had suffered from serious labor troubles since the war started Cincinnati had been remarkably free from anything of the kind and that local labor difficulties had been confined to a very few small strikes during the past twelve months.

The following officers were elected to serve during the coming year: President, J. B. Doan; vice-president, W. T. Emmes; treasurer, H. W. Kreuzberg; secretary, Charles A. Bickett, and business secretary, J. M. Manley. The executive committee is composed of E. S. Sawtelle, J. W. Carrel and A. H. Tuechter.

Among the guests present were I. Mitani of Tokyo, Japan, and H. L. Ennis and E. L. Spain of Columbus, Ohio.

Iron Ore Shipments

February ore shipments from Lake Erie docks to furnaces amounted to 555,852 gross tons, as compared with 199,091 tons during January, and 680,759 tons during February a year ago. Shipments for the season to March 1 were 36,585,019 tons, as compared with 38,271,819 tons during the same period a year ago. Stocks on docks March 1 were 9,515,221 tons, as compared with 8,449,839 tons on March 1, 1917.

An export duty on manganese ore from Mexico has been fixed at 3 per cent ad valorem, based on New York prices.

THE FABRICATED SHIP

Skews Taken Out of the Usual Design and Sterns Not of Cast Steel

WASHINGTON, March 12.—That the plant for building fabricated steel ships, which is being worked out in three Government-owned shipyards, is entirely practicable, notwithstanding the criticism of shipbuilders of long experience, is vigorously asserted in a statement made to the Senate Committee on Commerce by Harris D. H. Connick, vice-president American International Corporation and its subsidiary, the American International Shipbuilding Corporation, which has contracts for building 200 fabricated ships at the Hog Island shipyard. Mr. Connick supports his statement by the first detailed description of this method of construction that has been given to the public.

The genesis of the fabricating shipbuilding plan to be followed at Hog Island, he says, was an advance made in stereotyped shipbuilding methods by the New York Shipbuilding Corporation. "There were several hundred feet between the plate and angle shop and these ways, "but there was no reason why there should not have been several thousand, or several hundred, miles; it would have worked just as well."

"The system of fabricating ships," he continued, "was not entirely limited to the New York Shipbuilding Corporation's yard. It was also used in another yard not far distant, the manager of which went further. He simplified the design of the ship to fit the fabricated principle.

"We straightened the vessel out at every point where we could," he said. "We took everything that was bent and made it as straight as possible, including all the internal workings of the ship. We also undertook to cut down all unnecessary details because we were going to build 200 ships. If we saved one rivet on a ship, we saved 200 on the lot; and if we could take one plate and prevent cutting off a single angle on it, we necessarily saved a similar operation on 200 plates. In this way, by eliminating unnecessary details, many thousand operations would be saved.

"We found, for instance, that one man could make a pump, but he was short in something that went into that pump; hence we looked for another man who would reinforce the first man and send him the parts necessary to build the pump. We found plants which could manufacture the electric lighting equipment, but which could not get the generators; so we tied those plants up with concerns that could make the generators.

"We first discussed a 4000-ton ship, but General Goethals told us he wanted something between 4000 tons, which the Submarine Boat Corporation was building, and 9000 tons, which the Merchant Shipbuilding Corporation was proposing to build; so he suggested that we try to work out our plan with a 7500-ton ship.

"We then made a new start. An ordinary ship has what they call a 'dead rise'; that is, the bottom plates are on a slope. If you fabricated a ship like that, you would have to cut all these plates to certain angles after they came from the mill, and on every one of these angles you would have to cut the corners. As there are thousands of them on a ship and as each operation would cost a few cents, we decided to square up the bottom. By investigation we had found that there were a number of boats with flat bottoms which were being operated successfully. The next point in designing that we had to take care of was the fact that as ships are ordinarily built they have a 'tumble-home' on the sides which had to be straightened out because, if that had not been done, we would have had to take every one of the rivets on that boat, which is over 400 feet long, and put them all in the fire and bend them before we could drive them. We succeeded in straightening that out.

"Now, the deck of a boat has a bow in both directions, due to the supposed necessity for drainage and the fact that the boat is rocking around. But the decks of a battleship are as flat as a table, and so after investigation we flattened the decks of our boat so that all became parallel. We straightened up the masts and the smokestack and the railings, and in every possible way

we ironed that boat out and squared it up according to our plan. This was done for economy and also because the bridge builders and tank makers are not familiar with the skew-geed work of a shipyard and it would be hard for them to comprehend ordinary ship plans. We wanted to make a plan of a ship and send it off 1000 miles to a bridge shop or a tank shop and have them make the material for us, so we made everything as square as possible. We did not sacrifice the structure of the ship because Lloyds have passed upon this ship and have given us an A-1 rating.

"The construction of the stern of this ship presented new problems, for it was very unusual. We found that if we put on the usual stern of cast steel, with the demand for steel castings then existing in this country, we could not get the castings. They simply were not to be had. So we had to get up a new kind of stern, but we wanted something practical and not a mere dream of a draftsman. After a study of all the vessels that did not use cast steel, we found in the north of England they were employing a stern built without the casting and that it was a well-known device there, so we adopted it."

Decrease in Steel Corporation Orders

Unfilled orders on the books of the United States Steel Corporation on Feb. 28 were 9,288,453 tons, a decrease of 189,400 tons from those reported for Jan. 31. This record compares with an increase of about 96,000 tons in January and of 480,000 tons in December. The February report registers the lowest amount of unfilled orders since February, 1916, when they were 8,568,966 tons. In February, 1917, they were 11,576,697 tons. The following table gives the unfilled tonnage at the close of each month since January, 1915:

	1918	1917	1916	1915
January	9,477,853	11,474,054	7,922,767	4,248,571
February	9,288,453	11,576,697	8,568,966	4,345,371
March		11,711,644	9,331,001	4,255,749
April		12,183,083	9,829,551	4,162,244
May		11,886,591	9,937,798	4,264,598
June		11,383,287	9,640,458	4,678,196
July		10,844,164	9,593,592	4,928,540
August		10,407,049	9,660,357	4,908,445
September		9,833,477	9,522,584	5,317,618
October		9,009,675	10,015,260	6,165,452
November		8,897,106	11,058,542	7,189,489
December		9,381,718	11,547,286	7,806,220

New Plant to Build Submarine "Killers"

Henry Ford will establish a plant on an 80-acre tract of land on the Lincoln Highway, between Newark and Jersey City, N. J., for the manufacture of submarine "killers," according to an announcement made in Detroit by the automobile manufacturer. Work on the new plant will be started immediately and it will duplicate the plant now being erected at River Rouge, near Detroit, also for the manufacture of submarine destroyers. It will employ from 10,000 to 15,000 men.

Mr. Ford has also announced in Detroit that eventually 100,000 men will be employed in the manufacture of farm tractors in the plant of Henry Ford & Son, Dearborn, Detroit. "The tractor industry is bound to become one of the leading industries of the world," said Mr. Ford. He said that he intends to devote the most of his time to the tractor business.

The new administration building of the Greenfield Tap & Die Corporation, Greenfield, Mass., was open for public inspection Tuesday afternoon and evening, March 5. Heretofore each plant has maintained its own office and shipping room. The erection of the new administration building on Sanderson Street permitted of centralizing the office and shipping work of the company's six plants, which are separated by considerable distances. Accommodations for 125 persons are provided in the portions devoted to offices alone, and the building represents important advances in construction and arrangement.

The Tri-M Machine Co. will build a new plant at Warwood, near Wheeling, W. Va., for which considerable equipment will be needed.

Free Entry for War Supplies

WASHINGTON, March 12.—With a view to meeting the situation that will arise in the event that Congress, at its present session, fails to pass the Chamberlain bill providing for entry, free of customs duty, of all articles and materials imported for war purposes, Senator Martin of Virginia, the majority leader of the Senate, has prepared an amendment to the urgent deficiency appropriation bill, which provides as follows:

During the present emergency, upon request made by the Secretary of War to the Secretary of the Treasury, and under such regulations as the Secretary of the Treasury may prescribe, there may be imported into the United States, without payment of duty thereon, raw materials, parts or partly fabricated parts of equipment and finished equipment required to hasten the production of munitions or machinery of war, or other necessary war supplies, whenever such duty would otherwise be payable directly or indirectly from the appropriations for the support of the Army.

This amendment embodies substantially the provisions of the Chamberlain bill, and it will be noted is limited to articles imported for the use of the Army. The Navy Department has secured the insertion in several recent naval appropriation bills of a similar provision and thus the situation with respect to war supplies has been measurably taken care of. The leaders have had under consideration the advisability of the passage of a comprehensive measure that would include war material of all kinds, irrespective of the department importing it, but considerable reluctance has developed on the part of members of both the Ways and Means and Finance Committees to the consideration of any independent tariff measure. It is probable, therefore, that the Chamberlain bill will be abandoned and that the Government, for the coming year at least, will rely upon the riders on the appropriation bills to secure the free entry of articles needed in the prosecution of the war.

Completion of the "Victory Plant" at Buffalo

The "Victory Plant" is a new Buffalo industry, just completed, built and equipped by the United States Government for the manufacture exclusively of steam turbines for the equipment of superdestroyers under the direction and supervision of the Bethlehem Shipbuilding Corporation, for the Government.

This plant was formally opened with dedicatory exercises on Saturday, March 9, participated in by the mayor and city council of Buffalo, General Manager E. P. Germain and other officials who are to operate the plant and a number of prominent citizens.

The buildings comprising the plant were erected under contract by the Aberthaw Construction Co. of Boston and were completed within a period of four months. The plant occupies a site of 20 acres on the northern border of the city, near Niagara River, and is connected by industrial switch with the Niagara Falls Division of the New York Central Railroad. The main structure is 220 by 750 ft., of steel, concrete and glass construction, its side and end walls consisting almost entirely of glass. There are auxiliary buildings, a large power house, administration building, restaurant building, rest-rooms, and hospital. The cost with equipment will approximate \$3,000,000. The operating force will consist of 2,500 men and 300 women. It is expected the plant will turn out 45 sets of turbines during the present year.

A. L. and M. I. Goldstein, Cleveland, have purchased the stock and equipment of the Cleveland Building & Machinery Co., that city. Most of the material will be scrapped, making available about 1000 tons of scrap for sale. The Cleveland Building & Machinery Co. will continue business by installing a new line of second hand machinery after the old material is removed.

The Uniontown Foundry Co., Uniontown, Pa., has been organized and proposes to build a foundry for which some equipment will be needed.

W. S. Gifford to Speed Airplane Work

W. S. Gifford, a director of the Council of National Defense, has been appointed by President Wilson a director of the United States Aircraft Board. He will spend most of his time in planning the production which the Aircraft Board will recommend to the Signal Corps. This appointment is the result of an investigation by the President of reports that aircraft production was lagging behind. An investigation of actual conditions throughout the country will be made by a special committee composed of Snowden Marshall, former United States attorney in New York; Edward Wells of the Babcock & Wilcox Co., New York, and a third member to be named later.

Senator Thomas of Colorado visited the White House a week ago and laid before the President evidence that production of airplanes was not being carried on as rapidly as necessary. Howard Coffin, chairman of the Aircraft Board, was called into conference, and agreed to the new measures of supervision.

The Aircraft Board contended that its work was going forward in record time. Though admitting that few perfected Liberty motors have been completed, its members contended that all difficulties have now been overcome, and that production will be rapid. It is said that by June 1 7000 training airplanes will be ready for service. By the same date more than 30 aviation schools scattered over the country will be in full operation.

Rationing British Steel by Zones

To facilitate the rationing of steel in Great Britain, the country has been divided into six areas, each under the control of a steel superintendent who represents the Admiralty and the Ministry of Munitions. An important function of the superintendent will be to advise and assist firms located in his area in obtaining steel for authorized purposes, and all firms requiring supplies are in the future to consult their steel superintendent and follow his directions. The six areas are shown on a map which the Admiralty has issued and will be known as the Scotch area; the North-East Coast area, which is within a line below the Tweed and then across the country just north of Barrow and south of York; the Sheffield area, which extends from a point at the north to include Leeds to a point south to take in Burton, and thence to the Wash to take in Peterborough; the Manchester area, from Barrow in the northwest to Halifax on the northeast, with Aberystwyth and Craven Arms at the corners of the southern boundary; the South Wales area, including London and the whole of the counties south of a line linking Craven Arms, Worcester, Towcester and Greater London. That leaves the Birmingham area, with Stoke-on-Trent, Shrewsbury and Worcester on the west, and the coast line of the eastern counties for its other limit.

Government May Build New Shipyard

The United States Senate Commerce Committee has decided to approve the suggestion of Charles Piez, vice-president and general manager of the Emergency Fleet Corporation, that new shipyards be constructed by the Government. Appropriations will be asked for the construction of at least one Government yard with not less than 10 shipways. The committee will advocate also the construction of at least one privately owned shipyard similar to that which the American International Shipbuilding Corporation has built at Hog Island, Philadelphia. The committee is said to have Brunswick, Ga., and Wilmington, N. C., in mind as possible locations.

Recently the plant of the Raymond Mfg. Co., Ltd., Corry, Pa., manufacturer of high-grade wire springs, was damaged by fire. The loss is estimated at \$10,000, confined to stock, finished materials and building. The company states that repairs and replacement will be made while its plant is in operation and there will be no delay in getting out orders.

Machinery Markets and News of the Works

LARGER GUNS TO BE MADE

Contracts Pending for Artillery

War Preparations Becoming More Active in Every Field of Government Service

War preparations are being speeded up in every branch of the Government service—ordnance, aviation, shipbuilding and railroads. Congress has been asked for a deficiency appropriation of \$400,000,000 for heavy artillery and a portion of this sum will be expended for the expansion of existing gun plants in eastern Pennsylvania. Guns and shells up to 16 in. will be made. Further details are not at this time available.

The Simplex plant of the Wright-Martin Aircraft Corporation at New Brunswick, N. J., has issued a list of nearly 500 tools for expansion of its facilities for manufacturing Hispano-Suiza aviation motors. Deliveries are wanted in six weeks.

The Symington-Anderson Co., Rochester, N. Y., is adding to its equipment for making 75-mm. guns, its former contract for 3-in. guns having been changed. This company has received an additional order for 1000 guns. Rathbone, Sard & Co., Albany, N. Y., are in the market for equipment for making 6-in. trench mortar bombs. The Remington Arms U. M. C. Co.'s plant at Ilion, N. Y., will add new tools for rifle manufacture.

Shipbuilding buying shows more activity. An Italian ship and engine company is in the market for considerable equipment. The Virginia Shipbuilding Corporation, Alexandria, Va.; the Atlantic Corporation, Portsmouth, N. H., and the Groton Iron Works, Groton, Conn., will all want more equipment shortly. The Groton Iron Works has bought 20 mono-rail hoists. The Queens Chamber of Commerce, Borough of Queens, New York, announces that a \$4,000,000 shipbuilding plant may be established in that borough.

The Government may take over several hundred machine tools which were sold to the Russian Government. Some of these were boxed for export and remain in storage in New York, while others have been

shipped to various plants which had Russian contracts. About 800 such tools are at one New England plant and have never been used. Their value is now being appraised.

Railroad buying is expected to begin soon. Lists of machine tools and other equipment have been prepared in Washington. Inquiries for locomotive wrecking cranes have been made by several Eastern roads.

Prices of locomotive cranes have declined about 10 per cent, this being the first decrease after 17 successive increases since 1915.

In Philadelphia there is considerable interest in reports that existing gun plants are to be increased in size. Considerable new equipment will be required. The Armstrong Cork & Insulation Co., Pittsburgh, has turned its 4.7-in. shell contract over to its Lancaster, Pa., plant and 97 new tools are being bought. Another company near Philadelphia is figuring on an 8-in. shell contract. The Link-Belt Co., Philadelphia, has bought a number of tools for the expansion of its hoist department.

A number of new contracts for fuse and other small work has created a better demand for screw machines and other small tools in the Chicago market.

In Cleveland the Willys-Overland Co., Toledo, Ohio, has bought 15 screw machines, 22 multiple spindle drills and other equipment for making gun carriages. The Victor R. Browning Co., Mansfield, Ohio, is buying new equipment for making gun mounts. The White Co., Cleveland, is buying for motor truck work, and the F. B. Stearns Co., Cleveland, is adding to its former purchases for the manufacture of Rolls-Royce aviation motors.

New England machine tool builders are interested mainly in the requirements of the Remington, Winchester, Marlin-Rockwell, New England Westinghouse and Colt's plants for the manufacture of Browning guns. All of these plants will probably add to their equipment.

Machine-tool builders are being supplied by the Government with blanks, which they are required to fill out and mail every month, giving the number of new priority orders they receive, also those against which shipments have been made.

New York

NEW YORK, March 12.

The Ordnance Bureau of the War Department has asked Congress for a deficiency appropriation of \$400,000,000 for the manufacture of heavy artillery and a portion of this sum will be expended in the expansion of present gun-making plants. Field artillery and shells up to 16 in. are to be made in this country and a large amount of new equipment will be required. It is probable that new facilities for the manufacture of large gun lathes and similar tools will have to be provided, as the existing plants are sold up on such machines for 12 to 18 months.

The Simplex plant of the Wright-Martin Aircraft Corporation, New Brunswick, N. J., on Monday issued a list of nearly 500 tools for the expansion of its plant, which is at work on Hispano-Suiza aviation motors. The list included more than 100 sensitive drills, about 50 radial drills, more than 50 engine lathes; also turret lathes, milling machines,

boring machines and other tools. Deliveries are wanted in six weeks. The new equipment will cost about \$1,000,000. The Sperry Gyroscope Co., Long Island City, N. Y., which is building gyroscopes for airplanes, has purchased a number of new tools.

The Symington-Anderson Co., Rochester, N. Y., which has equipped a large plant for the manufacture of 3-in. field artillery, has had its contract changed to 75 mm. field pieces and 1000 guns, which were to have been made at the plant of the Wisconsin Gun Co., Milwaukee, Wis., have been transferred to the Rochester plant. The Symington-Anderson Co. is buying considerable new equipment and will soon be turning out guns on a large scale.

Rathbone, Sard & Co., Albany, N. Y., a stove concern, has taken a contract to manufacture 6-in. Newton-Stokes trench mortar bombs and is in the market for new equipment, including 10 turret lathes.

The Ilion, N. Y., plant of the Remington Arms U. M. C. Co. will buy a considerable number of new tools to add to

its capacity for the manufacture of rifles for the United States Army.

Hundreds of machine tools which were bought by the Russian Government either for export to Russia or for use in American factories on Russian munitions and rifle contracts will doubtless be taken over soon by the United States Government and shipped back to the factories from whence they came for changing over from metric to British measurements. These machines will then become available for American factories. It is said that there are 800 tools at one New England factory which have never been used, the Russian debacle having suddenly stopped work on Russian contracts.

The Fiat-San Giorgio Co., Ltd., which has shipbuilding and engine building plants at Torino and Sepzia, Italy, has sent a representative to New York to make purchases of shipbuilding equipment.

Buying by shipbuilding companies in this country is becoming slightly more active. The Virginia Shipbuilding Corporation, Alexandria, Va., has yet to close for a considerable part of its equipment. The Atlantic Corporation, Portsmouth, N. H., has taken over the Mason Machine Works, Taunton, Mass., where it will build engines for ships. The Mason Machine Works has placed an order with the Shaw Electric Crane Co. for a 30-ton traveling crane. A list of cranes to be bought for the plate and angle shop of the Atlantic Corporation will soon be issued. The Groton Iron Works, Groton, Conn., has purchased 20 mono-rail hoists, 3 and 3½-ton capacity, from the Shepherd Electric Crane & Hoist Co. The Groton plant will be considerably enlarged, including an addition to the plate and angle shop. Other purchases of equipment are to follow.

The Chamber of Commerce, borough of Queens, Long Island, N. Y., announces that a company, in which foreign capital is interested, is negotiating for property in Queens borough for a shipyard, and that \$4,000,000 will be expended in improving the property and purchasing necessary equipment. Further details are not at present available.

Bids were opened in Washington on Monday, March 11, on 21 cranes for the Washington Navy Yard. The cranes will cost several hundred thousand dollars. The Worthington Pump & Machinery Corporation has purchased a 10-ton traveling crane for its Deane works at Holyoke, Mass. The General Electric Co. will close this week for a 20-ton crane for its Everett, Mass., works. The Mansfield Foundry Co., Mansfield, Mass., is expected to buy a 5-ton crane this week. The Air Nitrates Co., New York, has bought a 5-ton hand-power crane.

Railroads are making inquiry for wrecking cranes from locomotive crane manufacturers. Considerable railroad buying in all lines of equipment is expected soon. Prices of locomotive cranes have been reduced about 10 per cent, this being the first decrease since prices reached their maximum. There have been about 17 increases, however, since 1915.

The American Thermostat Co., Newark, has been incorporated with a capital of \$125,000 by Louis Hodecker, Albert S. Bevens and Donald W. Smith.

The Chime Whistle Co., Newark, has been incorporated with a capital of \$125,000 by A. L. Friedmann and William J. Woodhead, Jr., Newark.

The Mengel Box Co., West Newark Avenue, Jersey City, has increased its capital from \$6,000,000 to \$10,000,000.

The Hay Foundry & Iron Works, Plum Point Lane, Newark, has awarded contract for the construction of a one-story shop, 86 x 165 ft., of brick and steel, to cost about \$30,000. It will be devoted to the building of ornamental cast-iron and steel work, such as stairs, railings, and other building work, which at present is put through its regular shop. Upon completion of the new structure additional capacity will be available for this class of work. Gilbert E. Crogan is manager.

The Allen Cutlery Co., Newburgh, N. Y., organized by A. J. Fowler, has secured a local site on Wisner Terrace, and will begin the construction of a factory soon. It will manufacture a one-piece pocket knife, and plans to employ about 50 men by late summer.

At a meeting of the New Jersey Metal Products Co., East Orange, N. J., recently incorporated, with a capital stock of \$100,000, Henry Bender was elected president, and A. J. Reeneson, secretary.

The Victor R. Browning Co., Cleveland, Ohio, manufacturer of special machinery, has acquired the factory of the Auto Press Co., Twenty-second Street, College Point, Long Island, N. Y., consisting of about 20,000 sq. ft. of floor space, for a new plant. It is understood that a large extension will be erected.

The Hidalgo Steel Co., New York, has been incorporated with an active capital of \$30,000 by H. H. Meyer, A. F. Zoeller and E. H. Wells, 150 Nassau Street.

The Williams Aircraft Corporation, Rockville Center, Long

Island, has been incorporated with a capital of \$100,000, by T. P. Hyatt, N. M. and M. S. Williams, 1931 Broadway, New York.

The Dukeshire Steel & Forge Co., New York, has been incorporated with a capital of \$25,000, by B. F. Schwartz, W. F. and W. B. Dukeshire, 299 Broadway.

The Federal Tool Co., New York, has leased the plant of the New York Watering Co., Whitestone, Long Island, consisting of about 18,000 sq. ft. of floor space, for a new tool-manufacturing works.

The Bolch & Oliver Co., Inc., New York, operating a welding works at 181 Christopher Street, will build an addition to its machine shop, to cost about \$7,000.

The Ocean Engine & Boiler Works, Brooklyn, has been incorporated with a capital of \$50,000, by F. B. Johnson, 1611 Foster Avenue; J. Cardinal, 13 Huntington Street; and J. C. Wilcox, Woodhaven, Long Island.

The Potdevin Machine Co., 253 Thirty-sixth Street, Brooklyn, has acquired for proposed extension additional property on Thirty-eighth Street, between Twelfth and Thirteenth avenues, Brooklyn, adjoining its works now in course of erection.

The Resilient Wheel & Rubber Co., New York, has been incorporated in Delaware with a capital of \$1,000,000 to manufacture wheels for motor cars. G. V. Reilly, S. B. Howard and Arthur W. Britton, 28 Nassau Street, New York, are the incorporators.

The Continental Shipbuilding Corporation, 103 Park Avenue, New York, has acquired waterfront property at Ludlow, Yonkers, N. Y., for a new shipbuilding plant.

The New York Air Brake Co., 165 Broadway, New York, is building four steel and concrete buildings, three about 1000 ft. in length, at its works at Watertown, N. Y., for the manufacture of ammunition specialties for the Government. It is expected to place the new plant in operation early in April.

The new addition to be erected at the ship and boatbuilding plant of Kyle & Purdy, King Avenue, City Island, N. Y., will cost about \$150,000. The extension, plans for which have been filed, will be three stories, 60 x 180 ft.

The New Amsterdam Gas Co., 130 East Fifteenth Street, New York, will build a one-story meter repair shop, 50 x 70 ft., at 720 First Avenue.

A new one-story power plant, 60 x 70 ft., will be erected by the American Smelting & Refining Co., Perth Amboy, N. J., at its Maurer works.

The William L. Black Implement Co., Hammonton, N. J., has been incorporated with a capital of \$50,000, by William L. and Horace G. Black and William A. French, to manufacture agricultural implements.

The National Anode Co., Passaic, N. J., has been incorporated with a capital of \$100,000 to manufacture copper castings. Albert G. Bray, Newark, and William F. Rothlisberger are the incorporators.

The Lobes Body Co., Mount Vernon, N. Y., has been incorporated in Delaware, with a capital of \$50,000, to manufacture automobile bodies, etc. L. C. and J. C. Smith, Mt. Vernon, are the incorporators.

The Metal Alloys Co., Albany, N. Y., has been incorporated with a capital of \$100,000 by S. P. Sweetzer, E. Corning and H. G. Batchellor, Colonie.

The Productive Metal Specialty Corporation, Weehawken, N. J., has been incorporated with a capital of \$50,000 by Frederick H. Hoffman, Weehawken, and Arthur and Martin Zinn, New York.

The Liberty Machine Tool & Die Co., Newark, has been incorporated with a capital of \$80,000 by Albert W. Wenzel and Charles L. Barrows, Newark.

The D. & D. Machine & Tool Co., Elizabeth, N. J., has been incorporated with a capital of \$50,000 by Otto H. Dissman and Walter Decker.

The National Carbonic Gas Co., McClellan Street, Newark, is having plans prepared for a one-story addition, 80 x 80 ft.

A new one-story concrete extension will be erected at the plant at 145-151 Frelinghuysen Avenue, Newark, recently acquired by Clucker & Hixson Co., 37 Murray Street, New York, for the manufacture of automobile supplies. It consists of a one-story main building, 75 x 110 ft., a drop forging plant, 50 x 75 ft., and a power plant.

The Eastern Brass Works, Newark, has filed notice of organization to operate a plant at 221 Thirteenth Avenue. John C. Rall, 170 Third Street, and Oscar Jaehnig, 12 Cliff Street, head the company.

The Hartwell-Rademaekers Mfg. Co., Newark, has been incorporated with a capital of \$150,000 by William H. Rademaekers and Albert E. Hartwell, Newark, to manufacture electric motors.

The new plant of the Diehl Mfg. Co., Trumbull Street, Elizabeth, N. J., to be erected at 810-50 Frelinghuysen Avenue, Newark, will cost about \$185,000 instead of \$100,000, as recently announced. Plans have been filed for a four-story plant, 180 x 300 ft.

William L. Glorieux, 122 Cottage Street, Irvington, Newark, has awarded contracts for the erection of a foundry, 62 x 200 ft., to cost \$13,500 without equipment.

Buffalo

BUFFALO, March 11.

Lawrence & Hill, Inc., Watertown, N. Y., recently incorporated with a capital stock of \$50,000, has been formed to take over a partnership of the same name which has been carrying on a business for 10 years in the manufacture of tools, gages, jigs and fixtures. Its present work is practically entirely on tools and gages for munition works.

The Highlander Machine Co., manufacturer of laundry equipment, has moved its plant from Spencerport, N. Y., to larger manufacturing quarters at 77 South Avenue, Rochester.

The Johnston Harvester Co., Batavia, N. Y., recently incorporated with a capital stock of \$10,000, will conduct an export business in machinery made by the Massey-Harris Harvester Co. The officers for each company are identical.

The International Railway Co., Ellicott Square Building, Buffalo, is having plans prepared for machine shop and repair shop additions at the foot of Spruce Avenue, Niagara Falls, N. Y. E. G. Connette is president.

The Beechnut Packing Co., Canajoharie, N. Y., is taking bids for additions to its factory, 70 x 180 ft., one story, and 70 x 83 ft., two stories, at an estimated cost of \$30,000.

The Cortland Specialty Co., Cortland, N. Y., is having plans prepared for a one and two-story factory, 67 x 177 ft., for the manufacture of chemicals. W. W. Hout is president.

The Brown Car Wheel Works, Inc., Buffalo, has been incorporated with a capital of \$500,000. It will continue the operation of its works at Howard Street and the New York Central Railroad. Howard G. Brown, Buffalo, and George M. Trefts and John G. Trefts, Hamburg, N. Y., are directors.

The Buffalo Wagon Works, W. D. Welch, president, 113 Charles Street, Buffalo, is having plans drawn for additions to its factory on Charles and Henry streets.

The Hewitt Rubber Co., 240 Kensington Avenue, Buffalo, manufacturer of air-brake hose, etc., has increased its capital from \$1,500,000 to \$3,000,000.

The Pullman Co., Buffalo, operating car repair works on Broadway, has filed plans for the erection of a new one-story extension to cost \$15,000.

The Mayer & Clarkson Co., Buffalo, has been incorporated with a capital of \$50,000, to manufacture heavy hardware and mill specialties. C. B. Clarkson, A. A. and A. L. Mayer, Buffalo, are the incorporators.

The Buffalo Wagon Works, 115 Carroll Street, Buffalo, manufacturer of wagons, sleighs, etc., is having plans prepared for a two-story addition, 35 x 45 ft.

The Augustine Automatic Rotary Engine Co., 1862 Elmwood Avenue, Buffalo, manufacturer of rotary engines, has filed notice of increase in its capital from \$1,000,000 to \$1,500,000.

The Castle Wilmot Co., 800 St. Paul Street, Rochester, manufacturer of sterilizers and sheet metal specialties, will build a two-story addition to its plant, 28 x 120 ft.

The Deft Appliance Co., Rochester, N. Y., has been incorporated, with a capital of \$10,000, by J. G. Tassell, G. H. Graham and M. J. Almstead, to manufacture patented appliances.

The Locke Insulator Mfg. Co., Rochester, N. Y., manufacturer of high-tension insulators, has increased its capital from \$800,000 to \$1,000,000.

The Delaney Forge & Iron Co., 300 Perry Street, Buffalo, will add to its forge plant at Perry Street and the Lehigh Valley Railroad a forge building, 130x300 ft., and a machine shop, 100x250 ft., one story, of steel, brick and concrete.

The Liberty Aircraft Corporation, Buffalo, has been granted a charter with a capitalization of \$1,000,000 to manufacture aero and hydro planes, automobiles and tractors. The directors are H. L. Jauch, J. J. Niederpruem and D. G. Drew of Buffalo. Arrangements for construction of a manufacturing plant are under way.

The O'Neill Iron Works, 263 Perry Street, Buffalo, manufacturer of sugar-mill and plantation machinery, has let contract to the Lackawanna Bridge Co., Buffalo, for construction of additions to its plant, including an erecting shop at Perry and Chicago streets and the Lehigh Valley Railroad to cost approximately \$100,000. L. C. O'Neill is president.

The Hession Tiller & Tractor Corporation, Buffalo, recently incorporated has purchased the three-story brick plant of the Chase & Baker Co., 153x250 ft., at East Jewett Avenue, Halbin Street and the New York Central Belt Line Railroad for its works.

The Stewart Motor Co., Buffalo, will add a one-story assembling and storage building, 92x110 ft., to its plant at East Delavan Avenue and the New York Central Belt Line Railroad.

The National Carbon Co., Cleveland, has let contract to the Osborn Engineering Co., Cleveland, for additional factory buildings at its Niagara Falls, N. Y., plant, including a six-story building, 54x103 ft., a two-story 20x114 ft., and one-story buildings, 70x144 ft., and 49x70 ft., to cost in all \$200,000.

The Jamestown Wheel & Axle Co., Jamestown, N. Y., is taking bids for a factory addition and storage building, 100x130 ft., on Tiffany Street.

The LaFrance Motor Truck Co., Elmira, N. Y., is having plans drawn for plant additions and alterations, 60x160 ft., and 70x100 ft., two stories.

The Willys Motor Co., will erect an additional factory building at Elmira, N. Y., 90x400 ft., one story, to cost \$80,000.

The Henner Automatic Oil Carburetor Co., Rochester, has filed incorporation papers, with a capitalization of \$100,000, by G. W. Henner, J. J. McInerney and G. J. Bauer.

The American Car & Foundry Co. is remodelling its plant at Depew, N. Y.

The Demarest Heating Corporation, 21 The Terrace, Buffalo, has increased its capital stock from \$10,000 to \$50,000.

New England

BOSTON, March 11.

While the machine tool factories are keeping up full production and even trying to increase it, there is a distinct dropping off in the active demand, so that many shops are promising deliveries from two to four months earlier than has been the case for over a year. There is a considerable volume of buying by New England plants engaged on munitions work and on tool and gage making, but large lists are rare. Much of the buying being done by plants preparing to make light and heavy Browning guns is heavy in volume but the machinery needed is being secured without spreading abroad large lists for bids. The Marlin-Rockwell Corporation, Remington Arms Co. and New England Westinghouse Co. are making large inquiries for new equipment and closing for it daily. The Colt's Patent Fire Arms Co., Hartford, Conn., is also acquiring much new machinery and is developing new machining methods that will greatly increase its output.

Labor demands are increasing but the machinists are evidently trying to gain their requests wherever possible without resorting to strikes. Toolmakers are the most restless class, and two or three strikes of minor importance have been settled by Government conciliation.

The Stark Tool Co., Waltham, Mass., has been incorporated with authorized capital stock of \$40,000. Robert M. Stark is president and John Stark, 46 Chestnut Street, treasurer.

The Tidd Recording Clock Co., Springfield, Mass., has been incorporated with authorized capital stock of \$10,000. W. J. Tidd is president and Robert L. Parks, 530 State Street, treasurer.

The Risdon Tool & Machine Co., Naugatuck, Conn., will build a one-story addition, 100 x 100 ft.

The Mobec Metals Co., Boston, has been incorporated with authorized capital stock of \$50,000. The directors are William B. Nash, president; Forrest L. Mitchell, Melrose, treasurer, and P. Shurtleff.

George S. Youngs, North Avenue, Bridgeport, Conn., has awarded a contract for an addition to a foundry, 20 x 72 ft., one story.

The Hamilton Abrasive Co., Westfield, Mass., has been incorporated with authorized capital stock of \$50,000 and has purchased a site on Union Street for a factory. Frank D. Hamilton, Buffalo, is president.

The Waterbury Mfg. Co., Waterbury, Conn., has secured a permit to build an addition, 46 x 66 ft.

The Merrill Mfg. Co., Boston, has been incorporated with authorized capital stock of \$50,000, to manufacture spark plugs and mechanical and electrical appliances. William E. Russell is president and Thomas B. Sweeny, 50 State Street, treasurer.

The Centrifugal Gun Co., Boston, has been incorporated

with authorized capital stock of \$1,000,000, of which \$944,000 is in patent rights. The incorporators are Frank L. Jones, Somerville, and Edwin C. Fisher and Earle L. Ovington, Newton.

Philadelphia

PHILADELPHIA, March 11.

There is no great activity in the Philadelphia machinery market, but there are rumors of new contracts which may be placed soon by the Ordnance Bureau of the War Department, which will require large quantities of equipment, mainly for gun manufacture.

The Armstrong Cork & Insulation Co., Pittsburgh, will turn its contracts for 4.7-in. shells over to its Lancaster, Pa., plant. Purchases on its list of 97 machines for this work are being made. Another company in this vicinity is figuring on an 8-in. shell contract.

The Link-Belt Co., Philadelphia, has bought a number of tools for the manufacture of a new hoist.

The Lutz Co., Inc., Philadelphia, manufacturer of compression tools, took possession on March 4 of the Joseph Pedrick Foundry Co., Twenty-fourth Street and Hayes Avenue, Camden, N. J., including buildings and equipment. The total floor space approximates two acres. The main building is 76 x 78 ft., with a cupola capacity of 12 tons per day. The Lutz Co. will increase the capacity of the foundry to 50 or 75 tons per day. The company has been incorporated with a capital of \$125,000 by William H. Lutz, Samuel Mason and Joseph S. Pedrick.

Henry Potts & Co., 650 Real Estate Trust Building, Philadelphia, have recently purchased the entire electrical equipment of the power house of the Reading Transit & Light Co. at Collegeville, Pa., and will begin dismantling at an early date.

The Reading Iron Co., Reading, Pa., states that its loss in the recent fire at its plant was not \$50,000, as reported, but was confined to the destruction of charcoal sheds and fuel entailing a loss of about \$3,000.

The Vibration Specialty Co., incorporated by Nicholas W. Akimoff, Harrison Building, Philadelphia, and others, plans both the manufacture of machinery for testing purposes, relative to vibrations and also research work along these lines. It maintains a laboratory of balance and Mr. Akimoff has specialized on the engineering of vibratory motion for some time.

The Lansdale Foundry Co., Lansdale, Pa., has started the erection of an additional pattern loft, 40 x 60 ft., and is also extending its pattern shop, 40 x 50 ft. Its output is for the most part valve, ship, locomotive and machinery castings for Government contracts. H. I. Landis is president.

The Susquehanna Casting Co. has been incorporated in Pennsylvania with a capital stock of \$75,000 to manufacture iron and steel. Ralph P. Wilton, Wrightsville, Pa., is treasurer.

The Interchangeable Grate Bar Co., Philadelphia, has been incorporated with a capital of \$90,000 under Delaware laws by Charles W. Rollin and Douglas Stewart, Philadelphia.

A one-story power plant, 27 x 59 ft., will be erected by L. M. Leberman Sons, Inc., Philadelphia, at its factory at 2626 Martha Street.

The Berwyn Commercial Body Co., Philadelphia, has been incorporated with a capital of \$100,000 to manufacture automobile bodies by Mark C. Mowery, V. T. and L. Cassin.

Fire Feb. 28 destroyed one of the buildings of the Albert Clark Foundry Co., Thirty-fifth Street and Gray's Ferry Road, Philadelphia.

The New York Shipbuilding Co., Camden, N. J., has filed plans for the erection of a new one-story, steel and concrete power plant, 109 x 118 ft., at its works on Broadway.

The Electric Company of New Jersey, Gloucester City, N. J., has been granted permission by the Board of Public Utility Commissioners to issue bonds for \$197,000 for extensions and improvements in its plant and system.

The Crescent Pattern Works, Trenton, has been incorporated with a capital of \$50,000 to take over and operate the plant of D. Harry Buhrman at 41 Parker Avenue. D. Harry and J. Buhrman, Waynesboro, Pa., are the incorporators.

The National Foundry Mfg. & Supply Co., Williamsport, Pa., has awarded contracts for rebuilding its one-story plant, 48 x 115 ft., recently destroyed by fire. The estimated cost is \$10,000.

A one-story power plant, 40 x 60 ft., will be erected by the Panther Valley Hospital, Coaldale, Pa.

The Perpetual Spark Plug Co., Dunmore, Pa., is having plans prepared for a two-story addition to its plant, 30 x 185 ft., to cost \$30,000.

The Buchanan Foundry Co., Lebanon, Pa., has acquired

one of the buildings formerly used by the Scranton Axle & Spring Co., Scranton, for about \$10,000. It will be used for a branch foundry.

The Traylor Shipbuilding Corporation, Allentown, Pa., has been granted permission, by the Commissioners of Navigation, Philadelphia, for extensions in its works at Cornwall.

Baltimore

BALTIMORE, March 11.

The Western Maryland Railroad Co., Continental Building, Baltimore, will build a one-story shop addition, 33 x 35 ft., at its wheel works at Hagerstown, Md., to cost about \$10,000.

The Imperial Auto Wheel Co., Hagerstown, Md., recently organized, is planning the erection of a building to cost about \$10,000. Victor C. West is president.

The Virginia Crane Mfg. Co., Fredericksburg, Va., has been incorporated with a capital of \$10,000 by Frank E. Porter and Charles D. Binns.

The Concrete Brick & Fence Post Co., Wheeling, W. Va., is considering the erection of a one-story plant. Theodore Smith is president.

The American Glass Works, Richmond, Va., has increased its capital from \$60,000 to \$250,000.

The Basic Steel & Iron Co., Richmond, Va., has been incorporated with a capital of \$10,000 to operate a foundry. James T. Hill, Richmond, and C. M. Liphart, Basic City, are the incorporators.

The Foundation Co., 233 Broadway, New York, is planning the immediate erection of a plant on the Savannah River, Savannah, Ga., for the manufacture of mine sweepers. The company has a tract with about 2500 ft. river frontage.

The Ponder Machine Co., Savannah, Ga., is planning the erection of a new machine shop. Thomas V. Ponder is president.

The Carolina Metal Co., Shelby, N. C., has been incorporated with a capital of \$5,000 by W. P. Love, J. S. Hoffman and R. Z. Linny, Shelby, to manufacture metal products.

The Savannah Warehouse & Compress Co., Savannah, Ga., will build an addition to its cotton compress to cost about \$200,000. The new extension will provide for an additional capacity of 100,000 bales of cotton a season. Col. G. Arthur Gordon is president.

The Cambridge Wire Cloth Co., Cambridge, Md., has increased its capital stock from \$6,000 to \$20,000.

The Phoebe Foundry Corporation, Phoebe, Va., has been chartered with \$50,000 capital. B. L. Williams, Hampton, Va., is president.

Chicago

CHICAGO, March 11.

The requirements of manufacturers having contracts for shell fuses and hand grenades promise a much more active movement of hand screw machines and small lathes for which the demand has been slow in recent months. The mill has been so indifferent, in fact, that deliveries often could be made out of stock. Small lathes, in particular, have been more active in the past week. Fuse makers are buying automatics, although in one case, at least, hand screw machines are being used for second operations.

Much gossip continues concerning contemplated munitions plants in or near Chicago, but they have not come to any definite fruition so far as can be learned, but inquiries for large quantities of shell-making machinery are still alive.

A change was made recently at the Rock Island Arsenal, Col. G. W. Burr being called to Washington and Col. Hillman taking his place as commandant. Manufacturing at the arsenal will soon be on an even larger basis than has been the case heretofore.

The Government is supplying machine tool sellers with blanks on which they must report monthly as to the number of new priorities they have received, also those against which shipments have been made.

Advances in price have been announced by two or three makers of small machines, and it is believed that other builders will follow in the course of the next week.

Several extremely large United States Army warehouses are to be erected in Chicago. The E. W. Sproul Co., 1129 West Thirty-fifth Street, has the general contract for a six-story army distributing warehouse, 500 x 600 ft., with a 10-story tower and one-story power house, at Thirty-ninth Street and Ashland Avenue. Two units, of concrete, are to be constructed at once at a cost of \$2,800,000, while the plans call for three units at a total cost of \$3,175,000. Work has been started, with George C. Nimmons, 122 South Michigan Avenue, as supervising architect for the Government.

The Arnold Co., engineers, 105 South La Salle Street, Chicago, is preparing plans and taking bids for a plant comprising 10 buildings at Marquette, Mich., for the Lake Superior & Ishpeming Railroad Co. The cost will be \$400,000.

The Illinois Vinegar Co., Chicago, has placed in the hands of Carpenter & Weldon, engineers, 30 North La Salle Street, the preparation of plans for two additions to refrigerating plants, to cost about \$100,000. They will contain two 75-ton absorption refrigerator machines and two air cooler machines.

The Crane Co., Kedzie Avenue and West Forty-first Street, Chicago, contemplates several improvements to its plant, including a two-story reinforced concrete building, 60 x 100, and the remodeling of several other buildings. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, are the architects.

Milwaukee

MILWAUKEE, March 11.

The machine-tool business continues active. While dealers report that the demand in the last few days has been almost wholly for single tools, manufacturers are still booking orders of considerable size. No large lots have appeared, but the aggregate of small orders makes a total practically equal to the volume of business in the last two months.

Metal-working shops complain of an increasing shortage of skilled labor. The supply of new help is practically exhausted, and it is stated by employment bureaus that seldom has the number of available men been so low. Female employment offices have many unfilled orders on file for girls to work as polishers on metal, drill and punch press hands, coil winders, etc.

The Hudson & Sharp Machine Co., 1207 Main Street, Green Bay, Wis., will erect a two-story machine-shop addition, 30 x 102 ft., of reinforced concrete and brick. New tool and other equipment is now being purchased. Contracts for the construction will be awarded about March 15.

The Utility Hoist & Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$25,000 to manufacture small cranes, hoists and specialties for motor truck dump bodies. The incorporators are W. C. Woodin, A. G. Kritch and A. J. Jansen. Arrangements for equipping a plant are being completed.

The incorporation of the Webster Electric Co., Racine, Wis., with a capital stock of \$600,000, under the laws of Wisconsin, has no special significance, as the new corporation succeeds one of similar name heretofore operating under a West Virginia charter. The plant at Racine was recently enlarged about 50 per cent. It manufactures ignition systems for stationary and portable internal combustion engines. The officers are: President, T. K. Webster; vice-president and general manager, Walter Brown; secretary, A. S. Loeb; chairman of the board of directors, M. S. Rosenwald.

The board of school directors, Milwaukee, Frank M. Harbach, secretary, will soon take bids for the construction of a new high school costing \$450,000, containing manual training and domestic science departments.

The Racine Auto Tire Co., Racine, Wis., has completed remodeling and equipping the former plant of the Fish Brothers Wagon Co., Racine, which it acquired about eight months ago. The group is 350 x 500 ft., two to four stories and provides 250,000 sq. ft. of floor space. It is operated throughout by individual electric motors. Lucius J. Elliott is president and Clarence Wright, secretary-treasurer and general manager.

The board of education, Wausau, Wis., expects soon to call for bids for the construction of the first unit of the proposed new industrial and vocational training institute, costing \$250,000. The first building will be 90 x 200 ft.

The Milwaukee Forge & Machine Co., 222-224 Lake Street, is preparing to move into its new plant at Oklahoma Avenue and the Chicago & Northwestern Railroad tracks.

The Northwest Engineering Works, Green Bay, Wis., has awarded contracts for the erection of an additional steel fabricating shop, 30 x 120 ft., 22 ft. high, and an addition to the boiler shop, 50 x 150 ft. The two floors of an adjoining building will be remodeled into mold lofts. The company is buying considerable equipment, including a 10-ton jib crane, two furnaces and an electric air compressor. Three new shipbuilding berths are being provided, making a total of five. It has contracts involving about \$500,000 for the construction and equipment of several steel ships of the smaller type. The first keel will probably be laid April 1. The increased facilities will be available about June 1.

The Topp-Stewart Tractor Co., Clintonville, Wis., which has started work on the construction and equipment of an original hydro-electric plant on the Embarras River about 12 miles north of the city, will make an initial installation

of 750 hp. Current will be transmitted to the new tractor factory in Clintonville. Thomas W. Orbison, Appleton, Wis., is engineer in charge.

The Western Malleables Co., Beaver Dam, Wis., was compelled to shut down from March 4 to 9 because of the lack of supplies and fuel. A shut-down of three days was also necessary the middle of February. New supplies have been arriving, however, and both the Elm Street and South Street foundries resumed operations March 11.

The Laursen Automatic Gearshift Co., Eau Claire, Wis., has started work on its new plant, 60 x 260 ft., four stories, of reinforced concrete, steel and brick. Only the first unit, 60 x 80 ft., four stories, will be erected at this time. The foundry will be on the top floor; machine-shop, third floor; assembly and testing room, second floor, and stock-room, warehouse and shipping department, with offices, on the main floor. Practically all parts of the device, a hydraulic type, will be die-cast of aluminum, bronze and brass. All machinery, furnaces and other equipment has been contracted for. Edward Hutchens, 866 Superior Street, Milwaukee, is consulting engineer.

Detroit

DETROIT, March 11.

Numerous inquiries for standard machines are being received and several good orders have been placed by companies having Government contracts. Automobile plants are rapidly adjusting themselves to take care of more war orders, and machine-tool jobbers are anticipating a good market in the next few months.

Shipbuilding plants are making additions and automobile companies are turning out more trucks than ever before. Automobile accessory factories are operating mostly on Government orders. Skilled labor is scarce.

The Commerce Motor Car Co., Detroit, has received an initial order from the Government for more than \$2,000,000 worth of trucks, according to a recent announcement.

The Home Furnace Co., Holland, Mich., which has been closed for some time, resumed operations March 1. James DeYoung of River Rouge, is manager. The company has complete patterns for three sizes of furnaces, which will take care of all kinds of heating.

The Ford Motor Co., Detroit, has produced a new 18-cylinder Liberty motor of over 75 hp. rating, which it is reported is being manufactured for the Government.

The Michigan Boiler & Iron Works, Grand Rapids, Mich., has been incorporated with a capitalization of \$10,000 by Peter A. Geldhof, John Snitseler, William R. Cook, and Carroll F. Sweet.

The Wolverine Grinding Wheel Co., Hall-Holmes Building, Jackson, Mich., has recently been organized to manufacture straight internal grinding emery wheels. Hugo C. Loeser is president and William H. Loeser, secretary-treasurer.

The Anderson Contractor Equipment Co., Detroit, has been incorporated with a capital stock of \$10,000 by James B. and William H. Anderson and John L. Hayden.

The Oval Wood Dish Co., Traverse City, Mich., has moved its factory to Tupper Lake, New York.

The Seward Pattern Works, Kalamazoo, Mich., has been incorporated to do jobbing machine work and make wood and metal patterns. The incorporators are A. L. Seward, Otto Gerline and H. S. Humphrey.

The Michigan Pipe & Iron Co., Lenox, will move its office and factory to Detroit.

The Carde Stamping & Tool Co., Saginaw, Mich., in which Cleveland men are interested, is equipping a two-story building, 65 x 150 ft. It recently placed its tool shop in operation, and expects to be in a position to do stamping work about April 1. The business is operated as a partnership composed of C. P. Craine, C. B. Castle, and Alex R. Pribil. The latter is factory manager. Its sales department will be maintained at 58 Cadillac Square, Detroit.

Cleveland

CLEVELAND, March 12.

There is a steady volume of new orders for machine tools for Government work, although there is a slight lull in Government buying of war equipment. The Willlys-Overland Co., Toledo, Ohio, which recently inquired for considerable additional equipment for making gun carriages has placed orders for 15 screw machines, 22 multiple spindle drills, and probably other machinery. The Victor R. Browning Co., Mansfield, Ohio, is buying machinery for making gun mounts, the White Co., Cleveland, which is building an addition for motor truck work, and the F. B. Stearns Co., Cleveland, working on an English order for Rolls-Royce airplane motors, are adding to their equipment. The Standard Parts

Co., Cleveland, is inquiring for several machines for its Hess spring plant at Carthage, Ohio, which was recently damaged by fire. There is a good scattered volume of orders for single machines.

The Lakewood Engineering Co., Cleveland, is enlarging its plant by the erection of a brick and steel building, 100 x 100 ft., for assembling and light storage purposes, and another building, 75 x 140 ft. of steel construction, to provide additional warehouse space.

The Unit Power Wheel Co., Cleveland, is a new company incorporated by Don B. Alexander and W. K. Stanley.

The Standard Parts Co. will build an addition to its American Ball Bearing plant in Cleveland.

The Gordon Propeller & Mfg. Co., Cleveland, has been incorporated with a capital stock of \$25,000 by S. C. Senick, J. O. Smith, Harry E. Moore, and others.

The Case Hardening Service Co., Cleveland, has acquired a site at 2273 Scranton Road, where it will erect a three-story plant and warehouse, 66 x 100 ft.

The Aetna Steel Castings Co., 2284 Scranton Road, Cleveland, will enlarge its plant by the erection of a foundry, 100 x 164 ft.

The Van Dorn Iron Works Co., Cleveland, has placed contracts for the erection of a machine shop, 50 x 120 ft.

Machine shop, foundry, mill room and pattern shop equipment will be required shortly for the Lakewood High School, Lakewood, Ohio. Specifications will be ready about March 25. The purchases will be under the direction of R. L. Short, director of schools.

The D. Connelly Boiler Co., Cleveland, will enlarge its plant by the erection of an extension, 40 x 80 ft. The contract will be placed shortly.

The American Steel & Machinery Co., Bucyrus, Ohio, has been incorporated with a capital stock of \$500,000. It is allied with the American Clay Working Machinery Co., Bucyrus.

The Columbiana Foundry Co., Columbiana, Ohio, is planning the erection of an addition, 40 x 100 ft.

The Trumbull Bronze Co., Warren, Ohio, has been incorporated with a capital stock of \$10,000 by M. A. Garvey, Thomas N. Boyle, and others.

The Swiss-Elkhart Magneto Co. has moved its plant from Monroe, Mich., to Toledo, Ohio, where it is occupying new quarters at Fernwood Avenue and the New York Central Railroad.

The Hastings Lock Co., Niles, Ohio, recently incorporated to manufacture an automobile lock, has elected W. R. Ash, president; Robert Hastings, secretary, and W. F. MacQueen, treasurer.

The Luntz Iron & Steel Co., Canton, Ohio, has been incorporated with a capital stock of \$100,000. D. S. Luntz and A. M. Luntz are among the incorporators. It has been doing a brokerage business for the past year as a partnership.

The Commercial Steel Castings Co., Marion, Ohio, has awarded contract for a new steel foundry. It will probably be in the market for new equipment.

The Melvin Saylor Co., Massillon, Ohio, will build a new machine shop, 40x150 ft. John Melvin is general manager.

Recent reports that the plant of the Crescent Machine Co., Leetonia, Ohio, builder of wood-working machinery, has been sold are incorrect. The company states it has not offered its plant for sale.

Cincinnati

CINCINNATI, March 11.

Companies in Dayton, Ohio, holding sub-contracts for building fighting tractors, or tanks, have recently purchased some equipment, but as a rule these plants were fitted up with the necessary machinery for handling this class of work.

Although the manufacture of automobiles has been reduced considerably the call for machine tools and other equipment from this source is improving. Practically all firms making pleasure cars are now engaged in war work, which accounts for the present demand for machinery.

Local manufacturers are very much interested in the shipment of goods by auto-trucks. On account of the railroad freight congestion one firm has now established a truck service between its factory and Middletown, Ohio, about 30 miles distant, and finds that the cost of delivering sheets to its plant compares very favorably with shipments by railroad. All auto-truck factories in this vicinity are working at full capacity. Jobbing foundries, making machine tool castings, are beginning to catch up with some of their contracts, but the recent delays experienced on account of slow ship-

ments of iron and coke produced a situation somewhat hard to overcome promptly.

The plant of the John B. Morris Foundry Co., Cincinnati, will be remodeled at an early date and additional equipment installed.

The capital stock of the Monitor Stove & Range Co., Cincinnati, has been increased from the nominal sum of \$1,000 to \$10,000,000. It will increase its manufacturing facilities in West End, but has not yet given out details.

The Cincinnati Specialty Mfg. Co., Cincinnati, has been incorporated with \$25,000 capital stock by J. E. Snyder, S. S. Oakley and others. The company formerly operated a plant at Powers Street and Sylvan Avenue under a partnership. An automatic extension reel for electric lights is one of the principal specialties manufactured.

The Pollak Steel Co., Cincinnati, has awarded contract to the M. Marcus Building Co., Cincinnati, for an addition to its power plant at Carthage.

The Foundry Equipment & Metals Co., Covington, Ky., has been incorporated with \$10,000 capital stock and has acquired the former plant of the Kenton Foundry Co. on Sixteenth Street. At present the property will be used for storage purposes but later a foundry may be operated. A. E. Clifton, Price Hill, Cincinnati, is one of the principal incorporators.

The Columbus Conveyor Co., Columbus, Ohio, has been incorporated with \$40,000 capital stock by W. H. Jones and others. No manufacturing plans have yet been given out.

The Atlas Brass Foundry Co., Columbus, will soon begin work on a three-story addition to its plant on South Front Street, part of which will be used as a toolroom.

It is reported that the Marvel Tractor Co., Columbus, will soon begin work on a new plant.

The Troy Metal Products Co., Troy, Ohio, has been incorporated with \$300,000 capital stock by A. G. Stouder, Herbert L. Johnson and others. It is reported that a plant will be located in the Camp Washington district of Cincinnati, and it is understood that the bulk of the product will be for the Government. No further details are available.

The Nolte Screw Machine Products Co., 1538 Freeman Avenue, Cincinnati, has acquired an additional site adjoining its plant on which it will erect a two-story building, 25x125 ft. Considerable new equipment will be needed.

Kirk & Blum, Cincinnati, sheet metal workers have equipped a plant at Fifth and Freeman avenues that will increase its capacity, together with additional equipment in its plant at York Street and Western Avenue, over 400 per cent. The company makes a specialty of dust collecting systems.

The removal of the main offices of the Fulfo Pump Co., and of the Amalgamated Brass Co., both of Cincinnati, to their new plants at Blanchester, Ohio, has been announced.

St. Louis

St. Louis, March 11.

Littleton Brothers, Newport, Ark., will rebuild their cotton gin and compress, recently burned, and will require about \$10,000 worth of machinery.

The Guthrie Cotton & Oil Co., Guthrie, Okla., will re-equip a cotton gin and install \$10,000 worth of machinery to replace that destroyed by fire.

The Gregory Drainage District, Gregory Landing, Mo., A. J. Ruddick in charge, will install pumps to cost \$50,000 and other accessory equipment.

Oak Grove, La., will give a franchise to a corporation to install electric light and power plant equipment. L. Grathwell is clerk.

The Kansas City Light & Power Co., Kansas City, Mo., Joseph F. Porter, president, will build a 250,000-kw. electric plant on the Missouri River, the initial installation being 40,000 kw. Sargent & Lundy, Chicago, are the engineers. The capital stock of the company is \$10,000,000.

Blackwell, Okla., will expend \$82,500 on additional electric light plant equipment.

Bristow, Okla., will spend \$36,000 on additional equipment in its electric light plant.

The Williams Mill Mfg. Co., Texarkana, Ark., has been organized by J. B. Sedberry and others and will equip a plant to manufacture farm machinery. About \$30,000 worth of machinery will be required.

The Ardmore Producing & Refining Co., Ardmore, Okla., William A. Rogers, president, will equip an oil refinery with a daily capacity of 5000 bbl. and is in the market for machinery.

The Cotton Plant Ice Co., Cotton Plant, Ark., J. K. Meadow, manager, will install about \$25,000 worth of ice-making machinery.

Texarkana, Ark., will equip a sewage disposal and pumping plant to cost about \$140,000. L. T. Peden, Houston, Tex., is consulting engineer.

The Interstate Tropic Ice Machine Co., Oklahoma City, Okla., has been incorporated in Delaware with a capital of \$200,000 to manufacture ice-making machinery. Robert Burns and O. P. Estes, Oklahoma City, and J. A. Gaines, Kansas City, Mo., are the incorporators.

The Swanson Plow Co., St. Joseph, Mo., has acquired the works of the Eagle Mfg. Co., Muskogee, Okla., and will establish a plant for the manufacture of agricultural implements. The company is said to be planning for the removal of its St. Joseph works to the new location.

Indianapolis

INDIANAPOLIS, March 2.

A company has been incorporated in Arizona with \$1,000,000 capital stock, to finance the manufacture of the Hurst airplane invented by J. S. Hurst, Terre Haute, Ind. W. A. Braden, Terre Haute, is president of the company and R. J. Pasternack, Terre Haute, is one of the promoters. It is planned to build five airplanes a week.

The Gregoriam Mfg. Co., Indianapolis, has been incorporated with \$10,000 capital stock to manufacture hospital equipment. The directors are Joseph F. Gregoire, George L. and Z. S. Bradshaw.

The Banner Gas Range Works, South Bend, Ind., has been incorporated with \$100,000 capital stock to manufacture ranges, stoves and heaters. The directors are Harry A. Engman, Jr., John C. Van Riper, Jr., and Samuel Parker.

The Central Pipe & Supply Co., Vincennes, Ind., has been incorporated with \$25,000 capital stock to manufacture pipe and machinery. The directors are Thomas F. Morrissey, E. M. Kerlin and C. E. Clark.

The American Steel & Wire Co.'s plant at Anderson, Ind., has resumed operations after being shut down for two months on account of fuel conditions and delays in receiving material. It employs 600.

Clessie Cummins has leased the lower floor of a plant at Columbus, Ind., which he will equip to manufacture tools for making grenades and rifle bombs. He has also a contract for 40,000 hubs for army wagons.

Texas

AUSTIN, TEX., March 9.

The Texas Co., oil producer and refiner, Houston, will make extensive improvements to its properties in the Tampico region of Mexico. It will lay an ocean loading pipe line and install one or more pumping plants. It also has in contemplation the construction of a large refinery at Tampico.

J. A. Kemp, Wichita Falls, and associates, are organizing a company to build an oil refinery. They have purchased 40 acres upon which the proposed plant will be located. It is stated that it will cost approximately \$500,000. The company is being promoted by a group of local capitalists.

The Texarkana Broom Co., Hope, Ark., will install a plant at Texarkana, Tex., for the manufacture of brooms.

The electric light and power plant at Bowie, owned by the Texas Power & Light Co., which was recently destroyed by fire, will be replaced by a new plant of larger capacity.

The Paducah Electric Co., Dallas, has been incorporated and will build an electric light and power plant at Paducah at a cost of about \$10,000. J. H. Barnes is a stockholder.

The Duplak Farmers Gin Co., Duplak, will build a cotton gin at a cost of \$10,000. M. C. Williams is a stockholder.

The Singer Iron & Steel Co., Galveston, has been incorporated with a capital stock of \$30,000. A. D. Singer is a stockholder.

The Farmers Union Gin Co., Ravenna, will construct a cotton gin at a cost of \$10,000. J. F. Hall is one of the promoters.

The Texas Electra Oil & Refining Co. has purchased 245 acres at Electra upon which it will construct an oil refinery.

The Grand Saline Salt Co., Grand Saline, is erecting three brick buildings in which it will install vacuum pans, pumps and engines for refining salt by the vacuum tank method.

R. L. Moore, Vernon, will build a brick plant of 25,000 bricks per day capacity at a cost of about \$35,000.

The Krueger Machinery Co., San Antonio, has been incorporated with \$100,000 capital to manufacture machinery.

San Francisco

SAN FRANCISCO, March 5.

The demand for machine tools has fallen off in the past two weeks or more. Even the shipyards, which are rushing equipment, have been seized with a disinclination to close orders as freely as before. There has been no known change in the situation to warrant this attitude to postpone purchases and the condition is expected to pass in a short time. The price has had much to do in forcing the smaller shops out of the market, and many of these are now coming back for cheaper tools. They feel that they cannot afford to pay the present price of high-grade equipment and then wait for a year or more before receiving deliveries. The mining machinery market has been very spotty. Seasonal conditions have interfered greatly with the mines, and the inquiry for gold-mining machinery has been less than for several years. The lack of rain and snow in the mountains has brought hydraulic mining to a standstill. On the other hand the demand for ferro-chrome has revived some of the old mines yielding chrome and has developed some others which promise well. Fully a dozen mills have been erected in the past few months to crush and concentrate this ore. Some of the old quicksilver mines are coming to the front with new discoveries and are putting in additional machinery. Notwithstanding the temporary decline in buying, the shipyards and the shops working on Government contracts remain the heaviest buyers of machinery.

The Pacific Coast Shipbuilding Co., San Francisco, is making good progress with its new plant at Bay Point. The first large structure completed is the plate shed, a two-story edifice, 80 x 400 ft. A 4000-hp., 23,000-volt power line, of the three-phase type, has been installed by the Great Western Power Co.

The Union Construction Co., Oakland, has secured another extension of the time in which it must take up its lease of 43 acres in Oakland for the purpose of constructing a shipbuilding plant. The company has not yet closed with the Government for any ships.

The Moore Brothers Shipbuilding Corporation, formerly known as the Moore & Scott Shipbuilding Co., Oakland, may have to postpone the triple launching of Government vessels on March 14 on account of a walkout of the crews on the Oakland municipal dredger. Deep water will have to be dredged in the inner harbor opposite the marine ways before the launching can take place. The lever men on the dredger demand an advance from \$135 to \$150 per month, and the electricians from \$125 to \$135.

The Honolulu Iron Works, Honolulu, has received an order from Manila for a complete sugar factory to be erected in the Pampanga district, about 70 miles from Manila. The mill will be erected for the Calamba Sugar Estate and will cost \$1,000,000.

The Union Iron Works, San Francisco, is rushing work on its Alameda plant. It is stated that within six months 4000 more men will be employed in the Alameda yards.

The E. G. Cox Mfg. Co., Oakland, has been incorporated with a capital of \$100,000 by E. G. Cox, Berkeley; George A. Gray, Harry W. Isaacs, Arthur Hargrave and Walter H. Judson, all of Oakland. The new company plans to make machinery.

The Interlocking Rim & Wheel Co., San Francisco, has been incorporated with a capital of \$500,000 by E. L. Peacock, San Francisco; H. A. Sellers, Knightsen, Cal.; L. B. Harvey, A. E. Hunter and A. B. Hattham, all of Stockton.

The Pond-Robinson Metal Saw Co., Ltd., San Francisco, has been incorporated with a capital of \$500,000 by W. R. Pond and G. E. Pond, both of Berkeley; C. A. Robinson, N. H. Robinson and George Cue, all of San Francisco.

The California branch of the American Can Co., which has plans to erect a can factory in Oakland, has secured a permit from the city to erect its first unit at East Eighth Street and Thirty-seventh Avenue, and it is expected that work will commence at once.

The Edwin Forrest Forge Co., San Francisco, was damaged by fire to the extent of \$10,000 on the night of March 1. The plant had been running night and day on Government contracts, but recently night work had been abandoned.

The Oakdale Milling Co., Oakdale, Cal., is about to build a mill to manufacture barley flour. The new mill will have a capacity of 100 tons a day.

The Standard Oil Co., California, is filling in a water front area of 100 acres at Richmond and will erect a refinery there.

W. R. Berry has awarded contract to W. T. Commery for the erection of a two-story and basement brick and concrete machine shop at Howard Street, east of First Street, San Francisco. W. H. Ellison is the engineer.

The Pacific Northwest

SEATTLE, WASH., March 7.

Machine tools and equipment of every kind are in great demand, the supply of new machinery having been lessened by congested freight conditions and slow deliveries. Among the industries calling for new equipment are grain elevators under construction and projected throughout Oregon, Washington and Montana.

A review of the shipyard activities in the Northwest in February shows that 183,500 tons has been completed for the allied merchant marine.

The Foundation Shipbuilding Co., Portland, Ore., is negotiating for the purchase of the Eugene Iron Works, Eugene, Ore., which it contemplates moving to Portland.

The Blewett Harvester Co., Pendleton, Ore., has sold its plant and holdings to the Blewett Mfg. Co., Portland. The business will be moved to Portland, where a larger plant will be built.

The Wheeler Box & Mfg. Co., Tillamook, Ore., has been incorporated for \$15,000 by W. S. Hidden, D. M. Clay, Jr., and Frank A. Rowe.

Plans for the factory, 104 x 126 ft., to be built by the Canadian Metals Ltd., Vancouver, B. C., are completed, and bids will be called for shortly.

H. D. Mills, Butte Falls, Ore., will erect a lumber mill with a daily capacity of 60,000 ft. Dewing Brothers, Kalamazoo, are interested in the project, which may also include a box factory.

The Thorsen-Hendrickson Lumber Co., Toledo, Ore., will build a sawmill with a daily capacity of 100,000 ft.

The blacksmith shop of the Meacham & Babcock Shipbuilding Co., Seattle, was recently destroyed by fire, together with its equipment and a portion of the iron stores, shed and bolt heating room. The company contemplates increasing its operations and adding 200 men to its force.

The Centennial Flour Mill Co., Seattle, has purchased a site on which will be erected a mill with a capacity of 700 bbl., a warehouse, and grain storage building with capacity of 250,000 bu. Grain handling, cleaning and milling equipment will be purchased.

The Klamath Iron & Steel Works, Klamath Falls, Ore., has selected a site on which will be constructed a foundry and machine shop. The company has been incorporated for \$20,000.

Canada

TORONTO, March 11.

The George F. Ross Machinery & Supply Co., Ltd., Montreal, has been incorporated with a capital stock of \$200,000, by George Davenport, Leo Delage, Ludger E. Potvin and others, to build engines and manufacture machinery, tools, implements, etc.

Crane, Ltd., Montreal, has been incorporated with a capital stock of \$1,500,000, by Ernest G. Bennett, Alfred B. Wright, Clarence Arnold and others to manufacture machinery, tools, supplies, etc.

The United Brass & Lead, Ltd., 284 St. Helens Avenue, Three Rivers, Que., is in the market for a 200-hp. motor, 25 cycle, three phase, 550 volt, 500 r.p.m.

Matthews-Blackwell, Ltd., foot of Bathurst Street, Toronto, is in the market for a pipe threader and cutter, up to 6-in.

The Canadian National Carbon Co., Ltd., Toronto, has been incorporated with a capital stock of \$1,200,000, by Howard A. Harrison, 2 Wilton Crescent; Robert E. Laidlaw, William N. Robertson and others.

The National Cabinet Co., Ltd., Toronto, has been incorporated with a capital stock of \$40,000, by Frederick C. W. Wagner, 34 Yonge Street; Charles J. Pense, William J. Kruit and others, to manufacture cabinets, musical instruments, furniture, etc.

The Rapid Radiators, Ltd., Toronto, has been incorporated with a capital stock of \$40,000, by John Campbell, Jacob H. Greenberg, 24 King Street West; Gordon T. Griffiths and others, to manufacture radiators, thermostatic controlling devices, etc.

The Galt Foundry Co., Ltd., Galt, Ont., has been incorporated with a capital stock of \$40,000, by Norman B. Colvin, Daniel Buchanan, William E. Demill and others.

Swaddling & Sons, Ltd., Cobourg, Ont., has been incorporated with a capital stock of \$40,000, by Charles J. Swaddling, John F. McGuire, and others, to manufacture machinery, motors, etc.

The Knight Metal Products, Ltd., Toronto, has been

incorporated with a capital stock of \$250,000, by William Bain, John J. Dashwood, 25 King Street West; Robert Gowans, and others, to manufacture machinery, tools, etc.

The Carlyle Dairy Co., 228 Fifth Avenue East, Calgary, Alta., is having plans prepared for a refrigerator plant to cost \$35,000.

Dr. J. A. Armstrong, president of the Oakoal Co., Royal Bank Building, Toronto, will have charge of the building and purchasing of machinery, furnaces, etc., for the plant to be built at Guelph, Ont., at a cost of \$60,000.

The Canadian Collieries, South Wellington, B. C., are making improvements to their mine and will install boilers and air compressors.

The Hamilton Bridge Works Co., Bay Street North, Hamilton, Ont., is building an addition to its plant to cost \$20,000 which will shortly be ready for the installation of machinery.

Bids will be called in April by the Armagh Electric Co., Armagh, Ont., for electrical equipment to cost \$40,000.

Government Purchases

WASHINGTON, March 11.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, as follows:

Schedule 1732, for Philadelphia—One boring, drilling and milling machine, 1 vertical boring mill, 1 planer, 1 metal planing machine, 1 crank slotting machine, 3 crank shapers, 2 upright drilling machines, 1 radial drill, 1 gap grinding machine, 1 two-wheel emery grinder, 1 wet tool emery grinder, 1 hacksaw machine, 1 pipe expanding and flanging machine, engine, extension turret and buffing lathes; early opening.

Schedule 3495½, for Norfolk—One gasoline engine electric generating set, 1 4-ton gasoline locomotive and 1 monorail electric hoist; opening of March 15.

Schedule 3496½, for Norfolk—Two revolving pillar cranes and electric hoists and cranes; opening of March 15.

Schedule 3507½, for Philadelphia—Oxy-acetylene cutting and welding outfits; opening of March 11.

Under specification 2839, until 11 a. m. March 25, for 1 electric traveling bridge crane of 10 tons' capacity.

Bids were opened at the Bureau of Supplies and Accounts, Navy Department, Washington, March 1 for material and supplies for the naval service as follows:

Schedule 3238½, Ordnance

Class 21, Washington—Nine lathes—Bid A, motor driven—Bid 35, \$21,364; 39, \$21,220; 45, units. Bid B, belt driven—Bid 35, \$21,064; 39, \$18,520; 45, units; 70, \$3,000, item 2.

Class 22, Washington—Five drill presses. Bid 18, \$2,010; 45, \$1,200, \$1,764 and \$1,739; 62, \$2,145; 65, \$2,794; 70, \$893, item 2.

Class 23, Washington—One drill grinding machine—Bid 28, \$231, f.o.b., and \$235, f.o.b.; 45, \$322 and \$195; 65, \$245; 70, \$240.

Class 24, Washington—Two universal tool and cutter grinding machines, belt driven—Bid 28, \$450, \$250 and \$300, f.o.b.; 45, \$852; 47, \$840; 62, \$1,047; 65, \$1,115; 70, \$465, f.o.b.; 83, \$650.

Schedule 3270½, Ordnance

Class 26, Newport, R. I.—One vertical turret lathe—Bid 21, \$5,205.

Schedule 3323½, Steam Engineering

Class 111, Brooklyn—One steam hammer—Bid 6, \$1,175; 40, \$1,120; 45, \$950; 47, \$950; 53, \$1,050 and \$1,100; 74, \$2,910; 82, \$1,164.

Class 112, Brooklyn—One No. 3 plain milling machine—Bid 11, \$1,786 and \$1,858; 32, \$1,768 and \$1,790; 45, \$1,860; 82, \$2,635.

Class 113, Brooklyn—One power punch, motor driven—Bid 15, \$2,230 and \$2,225; 37, \$2,725; 47, \$2,095; 74, \$1,910.

Similar bids were opened March 4, for supplies for the naval service:

Schedule 3333½, Construction and Repair

Class 31, Norfolk—Two trimming presses—Bid 22, \$9,460; 40, \$9,177 and \$10,207; 44, \$13,900; 15, \$12,965 and \$13,820; 45, no total; 65, \$11,560.

The names of the bidders and the numbers under which they are designated in the above lists are as follows:

Bid 6, Buffalo Foundry & Machine Co.; 11, Brown & Sharpe Mfg. Co.; 15, E. W. Bliss Co.; 18, Baker Brothers; 21, Bullard Machine Tool Co.; 22, Ferracute Machine Co.; 28, Wm. F. Davis Machine Tool Co.; 32, Fairbanks Co.; 35, Greenlee Brothers & Co.; 37, Hilles & Jones Co.; 39, Jones & Lamson Machine Co.; 40, Massillon Foundry & Machine Co.; 45, Manning, Maxwell & Moore, Inc.; 47, Niles-Bement-Pond Co.; 53, Nazel Engineering & Machine Works; 62, Swind Machinery Co.; 65, Sheritt & Stoer Co.; 70, Frank Toomey, Inc.; 74, Williams-White & Co.; 82, D. Nast Machinery Co.; 83, McDonough Mfg. Co.